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STEPWISE REACTIVATION OF NIGERIAN NATIONAL PAPER MANUFACTURING CO. IWOPIN PAPER MILL

REPORT ON THE
TECHNICAL AND FINANCIAL ASSESSMENT
(PHASE II REPORT)

for
UNIDO, VIENNA, AUSTRIA

by
HANS RAHM INGENIEURPLANUNG AG
Männedorf/Zürich, Switzerland

in cooperation with
GOPA Consultants, Bad Homburg, Germany

P-5108/03.6-2

UNIDO / NIGERIA

Stepwise Reactivation of Iwopin Paper Mill

Table of Contents

P-5108/03.6-2

./..

P-5108/03.6-2

A-4.3:	1	- Material Requirements and Costs
	2	- Projected Payroll of Iwopin Paper Mill
A-4.3.2:	1	- Distribution and Administration Expenses
A-4.3.3:	1	- Analysis of Contribution Capacities
	2	- Cash Flow for FIRR before Taxation
A-4.4:	0	- Average Exchange Rates 1977-1990
	1	- Project Profit and Loss Account
	2	- Cash Flow for Financial Planning
	3	- Projected Balance Sheet
A-4.5:	1	- Break Even Analysis

SUMMARY

This report covers the results of the investigations concerning the stepwise reactivation of NNPMC's Iwopin Paper Mill Project, and its technical and financial implications.

The project is an integrated bleached kraft pulp and paper mill with approx. 100'000 BDM t/y of pulp, two writing and printing paper machines designed for approx. 170 t/d, and auxiliaries for an "island" operation.

Mechanical status and previous approaches:

The project construction work commenced in 1977 and stopped in 1983, leaving the mill incomplete, due to financial and other constraints. Since this time, it rests idle at a rather advanced stage of delivery, construction and erection of equipment. The overall degree of completion is estimated to be

- approx. 90% for procurement of equipment and supplies
- " 85% for civil works, and
- " 45-75% for equipment erection,

whereby considerable differences exist for the degree of mechanical erection of the individual mill sections.

As the buildings are in an advanced stage of completion, the condition of the equipment under roof appears to be fair, with a rather wide band of uncertainty. No systematic mothballing has been undertaken.

1989, the Federal Government of Nigeria requested technical assistance from UNIDO, to provide advisory services for the projects reactivation.

Unlike previous approaches to this task, by

- Parsons and Whittemore Lyddon, U.K. in 1987 and
- Stothert Management Services, Canada (the former technical partner of NNPMC) in 1988,

who both proposed a complete mill reactivation, UNIDO suggested a stepwise procedure, and contracted HANS RAHM INGENIEURPLANUNG (HRAG), Switzerland to execute the corresponding advisory work.

Models of approach:

3 consecutive steps of reactivation were envisaged by HRAG:

Model A: Operation of the paper converting plant and the existing diesel generators, producing paper in sheets from purchased rolls.

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Model B: Operating of one paper machine line, with purchased pulp and the converting plant. Power supply would be from a new package diesel generator, steam for process from a new low pressure package boiler.

Model C: The whole mill including pulp mill and forestry operations is reactivated.

In a first evaluation (Phase I of HRAG's work, see separate report), Model A was ruled out as economically not viable, whereas Model B, requiring approx. US $ 15'000'000,- for fixed investments, and US $ 20'000'000,- for working capital, and assuming that all costs and expenses incurred upto now are regarded as sunken costs, showed a FIRR (financial of internal rate of return) on the additional investment of 16%.

The ongoing reactivation of the whole mill, i.e. Model C, out of Model B is covered by this report (Phase II report).

Capacities envisaged:

Model B: Increasing from 40'000 tpy of paper in the 1. year to 57'800 tpy for the consecutive years,

Model C: Similarly increasing, and finally reaching 115'600 tpy of paper and 34'100 tpy of sales pulp.

Market:

The market situation has superficially been reviewed only: The local requirements of 110'000 tpy of writing and printing papers (1990) would not be covered by the Model B production (40'000 to 57'000 tpy), whereas Model C could, theoretically, fully replace the present imports, and a surplus could be exported. Confirmative market surveys are, however, recommended in case of the decision to go ahead with the reactivation.

Main raw materials:

Bleached pulp for Model B would be imported.

The results of the brief assessment of pulp wood for Model C shows that the supply potential exceeds requirements in the first 5 - 10 years of operation, but afterwards, it would drop below demand. This clearly indicates the need to continue the plantation of Gmelina arborea in time.

Chemicals and additives are available, or are produced at the mill site.

Technical concepts:

Model B reactivates one paper production line, including the converting plant. As the reactivation of the boilers and power generators would mean major large expenses, the installation of

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small package units (boiler, diesel generator) are proposed.

A part of the housing colony would be activated.

Model C bases on a running Model B. The pulp mill would be reactivated as originally planned, with the exception of the bleach plant and consequently, the chemicals preparation. They would have to be modified to suit today's requirement of reduced emissions of chlorinated organic compounds in the effluent, by replacing most of the chlorine and hypochlorite by oxigen and peroxide.

The paper mill would be completed by starting the second paper line as well.

All auxiliary plants and the housing colony would be completed as originally planned.

Time schedule for implementation:

The stepwise reactivation is expected to take approximately 8 years:

- The 1. and 2. year is required to definitely indentify and order new and replacement equipment for Model B.

- In the 3., 4. and 5th year Model B works with increasing output (40'000 to 57'000 tpy). Meanwhile, identification, ordering, supply and erection of new and replacment equipment for completion of Model C takes place.

- In the 6th year, Model C starts up, and reaches its rated capacity in the 8th year.

Investment costs:

The investment costs to complete the project are estimated as follows:

- Preinvestment expenses:	US $ 32,0 million
- Capital expenditure for paper mill (Model B):	US $ 57,2 million
- Capital expenditure for pulp mill (Model C):	US $ 186,0 million

Financial appraisal:

NPV and FIRR

The calculation of the net present value (NPV) and the financial rate of return (FIRR) follows the assumptions and the method outlined below:

- The calculation applies the sunken cost approach,
- the time period for the analysis is 17 years,

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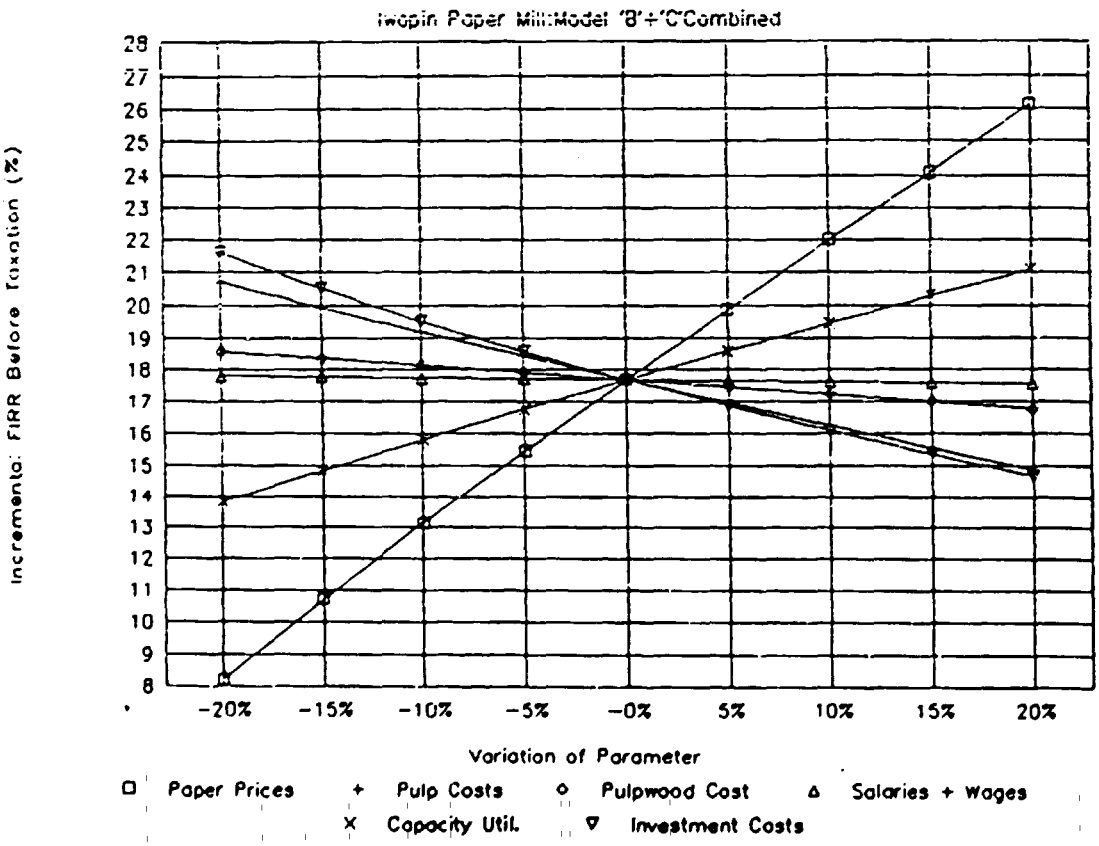
- the calculation is done in real terms based on 1990 prices,
- at the end of the projection period, the accumulative built-up working capital is assumed to be recovered in cash,
- the residual value of the plant is considered to be zero for the paper line.
- in case of the pulp line a residual value corresponding to the balance of economic life (15 years) and actual usage has been considered and
- the net present value is computed for a discount rate of 10%.

The calculation assumes the subsequent commissioning of Model B in 1993 and the start of the Model C in 1996. The anticipated sales of printing and writing paper total 115'600 tons anually. The financial rate of return has been competed at 17,7%. The net present value at 10% is US $ 107,4 million.

If Model B is regarded individually, the rate of return based on updated prices is 11,1%. The anticipated sales of printing and writing paper in this are total 57'800 tons annually.

Sensitivity Analysis - FIRR

In addition to the calculation of the FIRR for normal conditions (as outlined above) the effects of reduced/increase, paper prices, pulp and pulpwood costs, salaries and wages, energy, capacity utilization and investment costs have been analyzed. The financial rates of return are shown as follows:



Project finances

The projection covers the period from 1993, the commissioning of Model B, till 2007.

(1) Profit and loss account:
The project is expected to generate a positive net surplus only afer commissioning of Model C, i.e. from the year 2000 onwards.The delay must mainly be attributed to the high depreciation allowance and the heavy financing costs. Thus the financial performance of the pulp and paper mill is very much related to the share of equity financing and the actual lending terms and conditions.

(2) Projected balance sheet:
It reveals a worsening debt/equity situation due to the accumulation of losses during the initial production years.

Break-even analysis

The analysis shows that the project is operating initially above its break-even level. In 1999 this level drops to 86% and from there declines steadily down to 51% in 2007 due to declining interest costs and depreciation allowance.

Männedorf, 30. April 1991

Report prepared by

R.J. Schut

R. Stoff

H. Rahm

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1. INTRODUCTION

The **United Nations Industrial Development Organization, Vienna, Austria** (UNIDO) has requested **HANS RAHM INGENIEURPLANUNG AG, Männedorf/Zürich, Switzerland** (HRAG) to provide "High Level Advisory Service on the Reactivation of the **NIGERIAN NATIONAL PAPER MANUFACTURING COMPANY LTD., - Iwopin Paper Mill**" (NNPMC).

In a first step to the implementation of the task, the "Phase I", HRAG's work consisted of a preliminary technical and economic assessment of the situation of NNPMC and the mill, and a specification of the technical and financial implications of a stepwise activation of the project.

UNIDO, in their "Terms of Reference" (vide Annex A-1), recommended the stepwise approach to the rehabilitation.

As a result of the Phase I-work of the assessment, two models "A" and "B" of a partial operation of the mill have been studied.

From the technical point of view, both Model A (converting only, 35'000 t/a) and Model B (one paper machine, converting and part of the auxiliary plants, 50'000 t/a) are technically feasible.

From the financial aspects, however,

Model A (converting only) did not appear attractive, the NVP and the FIRR are negative, whereas

Model B, on the other hand, showed an interesting FIRR of 16% on the new investment. It was concluded that Model B is a proper basis for the 1. step of the project reactivation.

The whole mill's rehabilitation (Model C) was only superficially covered by the Phase I Report, as the establishment of fairly reliable investment costs were impossible to achieve within the short time available. -

Furthermore, it appeared to be desirable from HRAG's point of view, to modify UNIDO's terms of reference slightly to the effect that a brief review of the wood supply situation was also included in the project appraisal. (Revised T.o.R. vide Annex A-1)

This report (Phase II) now covers

- the updated Phase I, i.e. paper manufacturing from purchased pulp only (Model B) and
- the development of the whole pulp and paper mills reactivation (Model C), subsequent to the mill's operation according to Model B.

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In implementing this assessment, HRAG cooperated with the firm GOPA, Bad Homburg, Germany for the preparation of the report sections on local input data and costs and on the economic and financial analysis.

HRAG also used the very valuable input from Messrs. A.M.Oseni& Ass., Ibadan, Forestry Consultants, regarding the wood availability investigations.

2. STATUS ANALYSIS

2.1. Consumption of Printing and Writing Paper

The annual writing and printing paper requirements of Nigeria in 1990 are estimated to be 110'000 t/a (vide table in Annex A-2.1). The assumed capacity for Model B (50'000 t/a) is thus well below the annual requirements, which are, at present almost 100% imported.

Model C, the whole mill's reactivation, bases on the ultimate production of 115'600 t/a of woodfree printing and writing paper in 1997, after a phasing-in period (Model B until start-up of Model C) between 1993 and 1997.

It is assumed that by that time,

- either the local demand has been developed to this level, or
- the balance between local consumption and production is exported.

As soon as the detailed financing negotiations for the reactivation of the whole mill starts, a corresponding, confirmative market survey has to be commenced as well.

2.2. Raw Material Base for Pulp, Printing and Writing Paper

2.2.1. Imported Pulp

In phase I "Model B" provides for the manufacturing of paper from imported pulp. Pulp of various brands is presently imported already by the other 2 Nigerian paper mills.

The following CIF Lagos prices have been used for the Phase I Report:

Bleached longfibered kraft pulp: US $ 840,-/a.d.t
Bleached shortfibered kraft pulp: US $ 790,-/a.d.t

With the implementation of phase II, i.e. Model C, the pulp requirements for the production of paper will be covered by the own production, except for a relatively small quantity of longfibered pulp, for blending with the locally produced pulp for technological reasons.

The pulp prices have come down during 1990, and are actually still dropping. In the calculations further down, the following figures were used for Model C:

Bleached longfibered kraft pulp: US $ 825,-/a.d.t cif
Bleached shortfiberes kraft pulp: US $ 725,-/a.d.t cif.

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2.2.2 Wood

(1) Pulpwood Potential

Pulpwood refers to the wood species of Gmelina Arborea with a diameter of above 7 cm. The wood is delimbed and debarked and cut to length of 2m. The calculation of the pulpwood potential is based on the plantation records compiled by the Forestry Management, Evaluation and Co-ordination Unit (FORMECU) in Ibadan, Nigeria. Accordingly the accumulated plantations of Gmelina Arborea in the Omo/Ogun and the Oluwa/Ondo region cover approximately 35,000 ha at the end of 1989.Further details are contained in the table 2.2.2-1 on the following page. The afforestation measures from 1990 to 1995 follow the AfDB projection while afforestations after 1995 have been assumed to continue at the level of the average annual afforestation results achieved during the period from 1975 to 1995. Reductions for watershed and losses due to insufficient weeding, fungus or forest fire have not been considered. It assumes improved forest maintenance and fire protection.

There were four main objectives for setting up the Gmelina plantation in Ondo and Ogun:

a. to provide short fibre pulpwood

b. to increase roundwood production from plantation development in order to meet part of Nigeria's increasing demand for utility grade timber

c. to provide employment and social services and to increase local wood production

d. to improve forest management

The estimate of the available pulpwood potential has been based on the following basic data and assumptions:

- density	0.35 dry m3/ton green weight
- yield	20 m3 sob/ha/year
- bark	20% - 16.5% m3sob (1)
- harvest losses	5.5% - 7.5% m3sob (1)
- timber	0% - 65% m3sub (1)
- fire wood	10% - 30% m3sub (1)

(1) depending on the age group. For further details refer to Annex A-2.2.2-page 2.

The analysis considers the harvesting method of clear cutting. The corresponding specific pulpwood quantities per age group (Annex A-2.2.2-page3) have been established in two steps: first the losses for bark and harvesting have been deducted from the standing volume over bark. The result is the volume harvested under bark, which will be used as timber for saw logs, poles,

Table 2.2.2-1: Plantations of Gmelina Arborea (ha)

Year	Region		Age	Total	Accum. Total
	Omo/Ogun	Oluwa/Ondo			
1965	0	20	31	20	20
1966	258	20	30	278	298
1967	205	0	29	205	503
1968	585	50	28	635	1138
1969	218	0	27	218	1356
1970	330	100	26	430	1786
1971	660	40	25	700	2486
1972	270	140	24	410	2896
1973	710	100	23	810	3706
1974	355	56	22	411	4117
1975	825	436	21	1,261	5378
1976	1,374	450	20	1,824	7202
1977	851	1,160	19	2,011	9213
1978	1,050	914	18	1,964	11177
1979	1,020	985	17	2,005	13182
1980	1,000	945	16	1,945	15127
1981	1,600	1,224	15	2,824	17951
1982	2,385	1,800	14	4,185	22136
1983	1,211	2,273	13	3,484	25620
1984	1,571	1,475	12	3,046	28666
1985	1,000	1,000	11	2,000	30666
1986	900	500	10	1,400	32066
1987	500	500	9	1,000	33066
1988	500	500	8	1,000	34066
1989	500	500	7	1,000	35066
1990	1,000	1,000	6	2,000	37066
1991	500	500	5	1,000	38066
1992	500	500	4	1,000	39066
1993	500	500	3	1,000	40066
1994	500	500	2	1,000	41066
1995	500	500	1	1,000	42066
1996	942	865	0	1,807	43,873
1997	942	865		1,807	45,680
1998	942	865		1,807	47,487
1999	942	865		1,807	49,294
2000	942	865		1,307	51,101
2001	942	865		1,807	52,909
2002	942	865		1,807	54,716
2003	942	865		1,807	56,523
2004	942	865		1,807	58,330
2005	942	865		1,807	60.137

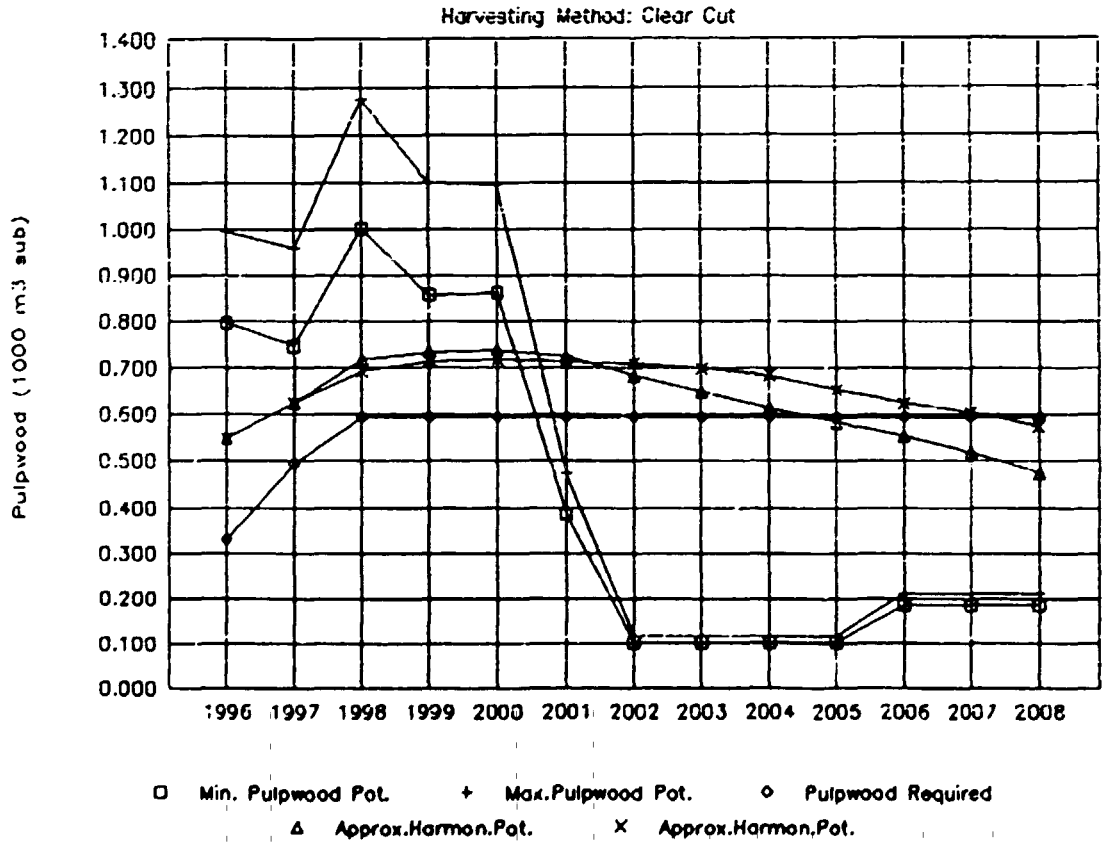
Source: FORMECU, Ibadan, Nigeria (1965 - 1995)

etc., as pulpwood for printing and writing paper and as firewood. In a second step the estimated maximum and minimum share of timber and firewood is deducted in order to establish the full range of the specific pulpwood potential.

Further to the above the plantation areas have been split into age groups, i.e. below 10 years, 10 years, 16 years, 21 years, 25 years and above. (refer to Annex A-2.2.2-page1).

The annual pulpwood resources have been determined by multiplying the available or projected plantation area of a specific age group with the specific pulpwood potential. The results are compiled in Annex A-2.2.2-page4. They have further been plotted against the actual requirements of Iwopin papermill. Figure 2.2.2.1 reveals that the pulpwood potential exceeds the requirements substantially during the initial production years. Thereafter, however, it drops to less than 1/5 of the demand improving slightly from the year 2005 onwards. If, however, supply is harmonized with the actual demand, the pulpwood supply could be secured up to the year 2004/2008 depending on the share allocated for timber and firewood. This indicates clearly the need to extent the Gmelina plantations in time. The required area depends to a large extent on the growth cycle and the share of timber and firewood.

Figure 2.2.2-1: Projected Pulpwood Potential



(2) Pulpwood Cost

The following components have been considered to establish the relevant pulpwood costs:

- harvesting or logging costs. They comprise felling, delimbing, bucking and debarking
- skidding on the road
- transport costs. Charges for loading and unloading are estimated separately
- costs for road construction and maintenance
- costs for afforestation measures considering only the replanting of the cut trees while an extension of the plantations has not been included.

The main parameters generally affecting above costs are:

- the species and size of trees found in a given stand
- the topography of the area
- the harvesting method
- labour productivity
- the density of stacked wood and
- the distance between the stand and the mill.

The analysis has been based on the following assumptions:

- pulpwood has been specified as debarked wood of 2m length and with a diameter above 7cm
- the topography is easy
- the proposed harvesting methods for thinning and clear cutting are summarized below:

Operation	Thinning	Clear Cutting
Felling	hand saw	chain saw
Delimbing	axe	axe
Bucking	hand saw (rest) hand saw	chain saw
Debarking	manual	manual
Skidding		
up to 100m	manual	manual/tractor
up to 250m	manual	tractor
> 250m	tractor	tractor
Loading	manual	manual

- the average distance between the paper mill and the plantations has been assumed to be 60 km.

The following table summarizes the computed pulpwood costs for Gmelina. It also contains the estimate prepared by Parson & Whittemore in 1987.

Table 2.2.2-2: Costs of Gmelina Pulpwood

Cost Element:		Cost Calculation (Naira/m³ sub)		
		Parson & Whitemore 1987	FORMECU Ibadan	
			1988	1990
Harvesting	Felling, Delimbing, Bucking		5.0	8
	Debarking		7.5	12
	Skidding (by hand or tractor)		3.75	6
	Subtotal	55	16.25	26
Transport	Loading		3.75	9
	Transport to Iwopin Paper Mill		5.0	100[1]
	Unloading		no provision to be done by the mill	no provision to be done by the mill
	Subtotal	23	8.75	109
Road Construction and Maintenance			10	16
	Overhead	2	5	10
	Stumpage/Royalties	10	20	27
	Subtotal	12	25	53
Total Pulpwood Costs		90	60	188

1) 9 ton truck load for transport from plantation to Iwopin paper mill.

2.2.3 Chemicals and Additives

Chemicals for Pulp Making

The following chemicals and additives are required for the production of wood pulp.

- salt cake
- lime stone
- sodium chloride
- sodium carbonate
- sulfuric acid
- various chemicals and additives for electrolytic plants and peroxide production

The table in Annex A-2.2.3 provides the relevant information.

Chemicals and Additives for Paper Making

The chemicals and additives required for the production of printing and writing paper comprise:

- alum
- rosin size
- starch
- china clay
- papermaking additives, like
  dye
  retention aid
  defoamer
  optical brightener, etc.

The table in Annex A-2.2.3 provides the relevant information on the sources and prices of the above chemicals and additives.

2.2.4 Packaging

Pulp Packaging

Market pulp is sold in bales wrapped in pulp sheets and tied with galvanized steel wire.

Packaging for Paper

Packaging material is supplied by the Nigerian Paper Mill in Jebba. In March 1990 the ex-factory price for 125 g/m2 wrapping paper was Naira 10,943 per t or Naira 11,250 per t free Iwopin paper mill.

2.3 The National Nigerian Paper Manufacturing Co.Ltd

2.3.1 Ownership

Owners of the Iwopin Paper Mill are the Federal Government, and the States of Oyo, Ondo and Ogun. The following tabel provides the relevant details on the allocation of shares and the actual paid-up capital:

Share holder	Shares	Capital Paid-up 1000Naira	Actual Paid up Capital 1000Naira	Call-in-arrears 1000Naira
Fed. Goven.	70%	98'000	98'000	0
Oyo State	10%	14'000	6'269,7	7'730,3
Ondo State	10%	14'000	6'269,7	7'730,3
Ogun State	10%	14'000	6'269,7	7'730,3
Total	100%	140'000	116'809.1	23'190,9

Source: Iwopin Paper Mill

The Federal Government assumes that it covered the call-in-arrears and therefore recognizes the following distribution of shares:

Share holder	Shares	Actual Paid up Capital 1000 Naira
Fed. Government	88%	121'190,9
Oyo State	4%	6'269,7
Ondo State	4%	6'269,7
Ofua State	4%	6'269,7

The original status of the 70/10/10/10 distribution has legally not been forfeited, since no deadline was given to the State Government to completely pay up their share capital. The balance sheet considers therefore the additional payment by the Federal Government of Naira 23'000'000 as additional loan.

2.3.2 Organization, Management and Manpower

As the mill is not able to run in the present status, it is quite obvious that no organization, management and manpower exists to operate the mill.

The set-up of manpower in spring 1990 is illustrated in Annex A-2.3.2.

2.3.3. Financial status

The financial status of the Nigerian National Paper Manufacturing Comapny Ltd. at 31st December 1989 reflects the unusual situation of an enterprise, which did not start operation although the majority of equipment had already been installed seven years ago. As a result the company's current liabilites exceeded by far the current assets at 31st December 1989. A breakdown is given below.

Current Liabilities				
-	Sundry creditors and accruals	Naira	145.2	million
-	Current portion of loan	Naira	65.8	million
-	CBN Bank loan	Naira	67.4	million
-	Total Current Liabilites	Naira	278.4	million
Current Assets				
-	Downpayments	Naira	4.1	million
-	Other debtors	Naira	1.2	million
-	Bank account	Naira	2.1	million
-	Total Current Assets	Naira	7.4	million

The current portion of loan includes defaults on local loans as well as unpaid interest charges on the foreign loan.

The details of the local loan situation are summarized in table 2.2.3-1:

Table 2.2.3-1: Local Loan Situation as at 31.12.1990 (+)

Original Loan		Interest Rate p.a.	Moratorium for Interest (years)	Moratorium for Principal (years)	Repayment Period (years)	Balance 31.12.1989 (1000 Naira)				
1000 Naira	Disbursement Date					Loan	Defaults			Total Outstanding
							Interest	Principal	Total	
11,784	10/2/81	8%	3	5	15	9,034	4,839	2,750	7,604	
31,000	30/12/81	8%	3	5	15	25,600	13,408	6,400	19,808	
12,600	20/12/82	9%	0	3	10	7,560	5,889	5,040	10,929	
5,500	1/6/86	9%	0	2	10	4,950	1,460	550	2,035	
21,000	1/6/85	9%	0	3	5	16,800	7,372	4,200	11,666	
1,000	10/84	9%	0	3	5	810	423	400	823	
500	21/12/84	9%	0	3	5	300	212	200	412	
84,384						64,044	33,603	19,540	53,277	

Source: Iwopin Paper Mill

2.4. Condition and Status of NNPMC Facilities

2.4.1. Machinery and Equipment

Physical Conditions of Plant Equipment

The HRAG/GOPA visits in March and Nov./Dec. 90 could, in essence, confirm the statements expressed in the Parsons and Whittemore (P&W) study that the visible condition of the equipment is better than what would have been expected. It reflects, no doubt, the quality of materials and workmanship of the works already done, the efforts of the custodians and the fact that substantial part of equipment is under cover. No systematic mothballing, however, has been undertaken.

More important for a possible start-up of equipment is the internal condition. Short of a detailed physical inspection and testing at this stage, only educated speculations can be made on this subject, resulting in a rather wide band of uncertainty. Particular fields of concern are:

- Corrosion of gears, roller or ball bearings etc, due to moisture entering the equipment by "breathing" when the ambient temperature changes,and sometimes enhanced by electrolytic action when non-ferrous materials are in contact with steel. As temperature fluctuations are not large at the site and the ambient air relatively free of corrosivity, it is unlikely that material damage took place.

- Corrosion of electric equipment. In particular, contacting surfaces in low voltage and low power control circuits, such as mechanical relays and switches, can develop nonconducting layers when idle, leading to (sometimes dangerous) failures in the control functions which are often very timeconsuming to detect.
  The suppliers of papermaking and converting equipment who were contacted, expressed, unanimously, concern about the internal condition of control panels and proposed to renew such equipment offhand rather than suggesting to reconditon it. (This is reflected in the high estimate for cost of preparation for startup in Models B and C.)

- Deterioration by ageing of certain elastomers, such as covers of press and transfer rolls in the papermaking machines and some converting equipment, rubber and plastic hoses, etc.
  The paper machine manufacturer expressed the opinion that after about 10 years the elastomeric roll covers would have become unsuitable and proposed to supply new covered rolls.
  For this reason, the new cost estimate for preparing a paper machine for startup is considerably higher than suggested in the P&W study.

Erection

In general, a large part of the main mechanical equipment has been erected, whereas the secondary or auxiliary equipment and machinery has not or to a very limited extent only. Details on the individual status of erection by mill sections is contained in Annex A-2.4.
The NNPMC's summary of completion of erection is judged to give the right order of magnitude, as follows:

- Mechanical equipment	45%
- Piping	10%
- Tanks	75%
- Electrical, incl. motors	17%
- Instrumentation	none
- Insulation	none
- Refractory and lining	none

Completeness of Supply

As far as the completeness of supply is concerned, the results of the detailed investigation carried out by P&W in 1987 have been found to be the correct basis for the judgement on the status, with a few components received since those investigations, such as the liquefaction equipment for the electrolytic plant, various control equipment components, boiler tubing.

2.4.2. Buildings and Civil Work

The general status of construction of the mill buildings and structures is considered to be rather complete. Only minor items (some stairs, platforms, railings and interior finishing for control rooms) are missing.

Equipment foundations are mostly there, the grouting of the erected equipment is, however, generally missing (exception: Papermachines).

Lining of concrete chests is missing, as well as the piping, nozzles etc.

Building ventilation is not installed.

The effluent lagoon still requires its lining, and, to some extent, repair work on the earthen walls.

The conditions of the buildings is also judged favourable: The roofs appear to be essentially rainwater tight, as only a few signs of water damage were visible on equipment.

The administration building requires a general overhaul and of course, the complete office equipment must be provided.

2.4.3. Infrastructure

The condition of the infrastructural items (housing, transport connections, water intake and effluent disposal) was investigated by comparing the actual situation with the findings of P&W in1987. (A general overview of the status is given in a NNPMC tabulation in Annex A-2.4).

Generally it was found that the results of the P&W investigations about the status and the reconditioning requirements can be confirmed by the HRAG/GOPA observations in 1990.

This means that the reactivation of the townsite, or at least parts thereof, is an absolute necessity for the project reactivation, as no other possibilities for accommodation of foreign and local staff for erection, commissioning and startup exists in the vicinity of the mill.

It further means that the water intake system needs to be completed, whereas only minor improvement appears to be required for the road to and within the mill (stabilisation of surfaces).

3. CONCEPT AND STRATEGY FOR REACTIVATION OF IWOPIN PAPER MILL

3.1. Propositions to Date

After the suspension of construction, 1983, two studies were made to determine the feasibility of reactivating the Iwopin project.

The first was a comprehensive appraisal by Parsons & Whittemore Lyddon Ltd., presented in June 1987, the second was in the form of a proposal by Stothert Management Ltd. (the technical partners in the initial phase) shortly afterwards to complete the mill and realise its full potential.

In both studies the opinion is expressed that the project is (still) technically and financially sound. It must be stressed, however, that in both cases the return of investment is based on the new capital required for the completion only, and all the investment and other cost up to now, i.e. US $ 335'000'000, is regarded as "sunken" cost.

The capital requirement assessed in both studies is substantial: US $ 136'000'000 + Naira 204'000'000 for P&W, and US $ 194'000'000 + Naira 304'000'000 for Stothert. (Naira at the respective time values.)

A brief analysis of the reasons for the differences shows that Stothert's estimates contain considerably higher costs for pre-construction, construction, erection and management, thereby more than offsetting P&W's substantially higher estimate for mill equipment to be purchased.
P&W proposes, in view of the fact that the plant's technology and sophistication of equipment and systems reflected the state of the art of the late seventies, to introduce newer techniques in a number of cases.

The financial statements in the studies are based on different annual paper production: P&W uses 65'000 ft/a, Stothert 92'000 ft/a. This difference is not explained.

P&W proposes, as an alternative, to raise the paper mill capacity to 100'000 ft/a for better viability.

3.2. Selection and Evaluation of Alternative

Besides the total plant reactivation approach (as presented by P&W and Stothert), and the stepwise, or phased schedule outlined further down under 3.3, other alternatives have been contemplated, with the following results:

A- Liquidation of NNPMC and sale of the equipment, piecemeal or in groups, to other interested parties outside Nigeria:
By all practical experience, considering the basic difficulty in finding suitable buyers, the secondhand value of unused equipment over 10 years old, would not be more than approx. 15% of the original value. This loss, plus the losses involved by abandoning the buildings and structures, as well as the infrastructural facilities etc. - even if the slim chance of selling it to other interested industries would materialize - is considered too extreme to pursue this alternative seriously.

B- Liquidation NNPMC, and sale of part of the equipment to one or both other Nigerian mills:
As all mills in Nigeria are State owned, this would not mean any commercial benefit. It would mean taking the money from one pocket to the other, plus the additional cost of dismantling and reerection, plus new buildings at the new site.

C- Liquidation of NNPMC, and sale of the whole mill in situ to an existing, large pulp and paper manufacturer with international activities in production and sales:

This alternative would mean the privatization of the whole enterprise, and leaving it to the new owner to complete and operate the mill, presumably including the forestry operation.

This could be an interesting option, if the reactivation approach as outlined further down (3.3) would not be sufficiently attractive, or would not materialize, due to other reasons.

- A variation to selling the mill may be its leasing to an international pulp and paper manufacturing company.

D- As far as the stepwise approach is concerned, the individual operation of the caustic-chlorine electrolytic plant has been suggested earlier.

This is, however, not recommended by HRAG/GOPA for further investigation in connection with the Iwopin reactivation, for the following reasons:

- Additional equipment would have to be purchased, which afterwards, when the whole mill is running, would not be required anymore: An evaporator, to concentrate caustic soda to the required level for sale, and a 15t/d chlorine liquefaction unit, as the present one has only approx. 25% (5t/d) of the capacitiy of the electrolytic plant.

  Furthermore, pressure tanks and bottles to safely store and distribute the liquid chlorine, along with maintenance facilities, would be required.

- The power requirements (connected load approx. 7.0 MVA) demand the hog fuel (or oil) boiler to be finished, the condensation turbo generator set to be made operative, besides the general services like water supply (for feed water), electrical distribution, etc.

- As the bleaching sequence is proposed to be changed in Model C, in order to reduce chlorine as bleaching agent and substitute the same by peroxide and oxygen, the capacity of the chlorine and alkali production plant changes, too. In other words, the whole bleaching chemicals preparation plant will be different, i.e. new.

  This means, however, that the electrolytic plant equipment as already supplied to Iwopin would be availabel to sale, or for the installation elsewhere in Nigeria.

3.3. Technical and Organizational Concepts

HRAG/GOPA'sconceptual approach of the partial rehabilitation of the mill originally resulted in the following 3 models: *

Model A: Operation of the paper converting plant with power supply from the existing diesel generators, producing paper in sheets from purchased rolls. Due to insufficient economics, this model has been dropped in Phase I of this assessement.

Model B: Operation of one paper machine including stock preparation and the converting plant. Power supply would be from a new large diesel generator, steam for process from a new low pressure package boiler, water from the water treatment plant. Paper would be produced from purchased pulp.

Model C: The whole mill including pulp mill and forestry operations is reactivated. This model is developed here as the logical extension of Model B, after this has been implemented and successfully operated.

3.3.1. Production Programs

For Model B, i.e. one of the paper machines working, using purchased pulp, 2 different grades of paper are assumed to be produced:

Grade WC, the lower price "wood containing" writing and printing papers without surface treatment, and
Grade WF-1, the top quality "woodfree" papers, with a size press surface treatment.

The furnish for Model B-concept is as follows (per Ft):

Grade WC, "wood containing" paper:

additives total	110 kg
total fibre	870 kg od
TMP (60%)	505 kg od = 590 ad
Chemical pulp, LF (40%)	335 kg od = 375 ad

Grade WF-1,"woodfree", surface-sized paper:

additives total	150 kg
total fiber	840 kg
of which 30% = LF	250 kg od = 280 ad
70% = SF	590 kg od = 655 ad

Both grades:

moisture content 6%:	60 kg

* see also Annex - 3.3 Block diagram

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For Model C, two grades of paper, and one grade of sales pulp are assumed to be produced:

Paper Grade WF-1, wood free writing and printing paper with surface treatment, and
Paper Grade WF-2, the same paper but without size press surface treatment.

The furnish for Model C-concept are as follows, per Ft.

Grade WF-1: Woodfree printing + writing paper, with surface sizing

Additives total		150 kg
Fiber total		840 kg
of which	30%=LF	250 kg od = 280 kg ad
	70%=SF	590 kg od = 655 kg ad

Grade WF-2: Woodfree printing + writing paper without surface sizing

Additives total		110 kg
Fiber total		880 kg
of which	30%=LF	265 kg od = 292 kg ad
	70%=SF	615 kg od = 684 kg ad

Both grades: Moisture content 6% = 60 kg/t

As far as production quantities are concerned, the following base assumptions apply:

For Model B: The papermachine capacity, at 100% efficiency, according to the specifications of the supplier, Escher Wyss, is 200 t/d, or in 340 d/y, 68'000 t/y. A rather conservative 73% capacity utilization has been used, to arrive at 50'000 ft/y, whereby the split of 35'000 ft/y in sheet form, and 15'000 ft/y in rolls has been made.

For Model C:
Pulp 101'000 ad t/a, of which 23'600 ad t/a market pulp
Paper, woodfree, with surface sizing 57'800 Ft/a
Paper, woodfree, no surface sizing 57'800 Ft/a.

The production of wood containing paper is not continued.

3.3.2. Reactivation of Production Lines Models B and C

In order to expedite the implementation of Model B and to save on expeditures, it would be advisable to make use as much as practicable, of equipment from those departments which come on stream later, in Model C. This would be particulary valid for general purpose equipment such as pumps, motors, electric equipment, instrumentation, (control)valves etc.

It goes without saying that such a procedure must be well controlled and administrated, so that at a subsequent revitalisation of the pulp mill (Model C) the parts can be reordered.
Another advantage is that further deterioration by non-use of those parts would be avoided.

The production line rehabilitation of Models B and C may be described as follows:

Model B: Producing Writing and Printing Paper on One of the two Paper machines

Fibrous base material is purchased in the form of short and long fibered woodcontaining and woodfree pulp.

- Purchased pulp, in grades as required, is dispersed (slushed) in (recycled) process water in the pulpers. The pulp suspension is then treated in refiners (beating) for optimum paper making properties. A number of chests (tanks)are available for intermediate storage, homogenizing and blending of the pulp suspension.

- Paper additives, required to give the paper specific qualities (starch, size, fillers, shade or colour) are prepared in the additive preparation plant.

- Various pulp qualities, broke (recycled production waste)and additives are blended in the correct proportions to form the papermaking stock.

- After final cleaning in rotary screens and hydrocyclones, and addition of certain agents to prevent foaming and fouling in the stock and water circuits and to enhance retention, the paper stock is made into the sheet on the paper machine. This machine consists of a wire section, where the paper web is formed, a press section where the web is dewatered by pressing, and the drying section, where the moist web is dryed to an (endless) paper sheet.

- Paper from the paper machine is rolled onto reel spools and then transformed to a slitter rewinder for producing

a - custom sized rolls
b - rolls for sheet cutters
c - rolls for cut size cutters.

- For these operations paper cores are required, made from kraft paper. For internal roll transport, a shuttle car system is available.

- Custom sized rolls are wrapped, the heads covered, weighed and marked for shipping and dispatched.

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- For producing paper in sheets and reams, the sheet cutters are used. After cutting the sheets are stacked in reams (500 sheets), then wrapped in wrapping paper on the ream wrappers and hence labeled and dispatched.

- For producing paper in cut-size (small size) sheets, narrow paper rolls produced from wider rolls on a slitter, are transferred to the cut-size lines consisting of sheeters and packers, then palletized and dipatched.

- Culled rolls can be "salvaged" on the slitter/rewinder.

- Special small orders in sheets can be made to size on the guillotine cutters, using air tables for ease of handling the paper stacks (reams).

- Paper cores for paper rolls and for internal use are manufactured on the paper core making machinery, using purchased kraft or bogus kraft (e.g. from Jebba) and glue. Paper rolls are cut to roll size on a core cutter and notcher.

- Trim generated at the roll slitters and sheet cutters is pneumatically removed and, along with imperfect sheets, etc. returned to the paper mill for re-use as fibrous material ("broke").

For special properties, e.g. for offset printing, the paper will get a surface treatment on the size press which is incorporated in the dryer section of the paper machine.

For the purpose of this model, two basic paper qualities are assumed:

a) woodcontaining writing and printing paper, representing a cheap economy paper for mass products like schoolbooks, exercise books, computer paper, non-durable publications etc., and
b) woodfree writing and printing paper for quality products like offset printing paper, stationary, copying paper, books, ledgers. This grade will be produced with surface sizing.

Model C: Producing of Bleached Gmelina Pulp and Woodfree Writing and Printing Papers on Two Papermachines. Sale of surplus bleached Gmelina pulp.

For this model, one grade of bleached pulp and two grades of woodfree writing and printing paper (surface sized and non surface sized) will be assumed.

- The pulp production line, from woodchip preparation to bleached pulp baling will be completed as originally

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designed, with one exception. in view of the worldwide gradual decrease of the acceptance of pulp bleached with elemental chlorine and of paper made from such pulp, it is proposed to modify the bleaching sequence in order to minimize the use of elemental chlorine.

The bleach plant equipment in place would further be used, but differently arranged: Instead of the original sequence D/C-E-D(orH)-E-D, a new sequnece O_2 - D/C-EP(or EOP)-D-D is proposed.

The oxigen delignification would be low consistency, thus enabling the maximum reuse of the existing equipment.

Both, oxigen and alkaline peroxide are produced on site.

In this case, oxygen and hydrogen peroxide will replace part of the chlorine. This modification has no influence to speak of on the pulp properties, but the content of chlorinated organic compounds in the effluent is drastically reduced.

The departments for recovery of pulping chemicals will be completed as per original design, but the electrolytic plant for bleach chemical will be changed to suit the above mentioned changes in the bleaching process. The capacity of the chlorine-alkali electrolysis and the chlorine dioxide plant can be reduced, or changed, respectively. Plants for oxygen and hydrogen peroxide have to be added. There will be no excess sodium hydroxide for sale.

The paper mill will be completed as orignially designed, i.e. both papermachines and the whole finishing and converting plant will be put to works.

Certain modifications of the stock preparation system would become advisable, in case of availability and use of waste paper for certain grades of writing or printing papers.

The availability of waste paper in Nigeria, in particular form large printing shops, should therefore be investigated as soon as a positive decision about the Iwopin project reactivation has been taken.

3.3.3. Reactivation of Utilities and Services, Model B and C

The general approach for Model B with respect to the provision of the utilities and services is not to complete the complex steam and power generation units, as this would result in too high capacity and costs for the type of operation envisaged for this model.

Instead, it is proposed that additional diesel generator capacity and a new package boiler for process steam will be installed.
This equipment may be kept or sold after the whole mill (Model C) has been completed.

In Model C, the utility and service departments will be completed as originally designed.

As far as the individual utility units are concerned,the following arrangements are being proposed:

WATER SUPPLY:

For model B: A process water supply capacity of 600-1000 m3/h must be foreseen.

This quantity can be handled by one lagoon pump with reduced impeller (or by a suitable smaller pump from the pulp mill inventory).

For clarification, 1/2 - 1 Pulsator will be sufficient. To suit the lower throughput, some modifications at one Pulsator may be required, in order to keep flow conditions in line with the design parameters (Pulsators must be kept in continuous operation for proper functioning).

For filtrating, a suitable set of filter bays can be selected to suit the lower capacity.

The diesel engines for driving one lagoon water pump, one process water pump and the clearwell fire pump, must be operational.

For Model C: The water treatment plant will be completed to its full design capacity, following the original concept.

EFFLUENT DISPOSAL

For Model B: The effluent of the paper mill has only little BOD load. It is sufficient to apply mechanical treatment in the clarifier only for fiber and filler removal. The aerated basins need not to be taken into operation. Permission must be sought to return the effluent (temporarily) into the lagoon at a suitable location.

For Model C: As per original design, all clarifiers and the biological treatment must be operational. During the early implementation stages of Model C it has to be assessed if the environmental legislation and proposed changes in the bleaching plant lead to changes in the original design of the effluent treatment plant.

POWER SUPPLY

For Model B: The relatively low steam and power demand do not justify the high cost of taking into operation a power boiler or a package boiler and a turbo-generator.

Instead, it is proposed that power will be supplied by the existing 4 diesel sets, complemented by about 5MW diesel power from one or two additional diesel generators.

Generation and distribution will be on the 3,3 kV level, feeding 3,3 kV/415 V transformers and the operational 415 V distribution centers, and 3,3 kV motors, where necessary. Diesel oil will be supplied from the existing diesel oil storage tanks.

An alternative to the purchase of the diesel set(s) could be a leasing arrangement. The leasing period would be defined by the time required until model C, the whole mill's rehabilitation, leads to the operation of the existing steam turbines.

For Model C: Basically the originally foreseen power generation with turbogenerators, using steam from the recovery boiler and power boiler will be operational. The diesel generators for standby and emergency power remain available.

The power distribution systems will be fully completed.

STEAM SUPPLY

For Model B: As mentioned under power supply, the relatively low LP-steam demand of Model B technically does not justify the operation of the existing steam and power plant and the high cost of its completion.

Instead , a new low pressure package boiler with a capacity of about 25t/h steam is proposed to supply the paper machine drying section with steam.

This boiler will be fired with fuel oil from the existing fuel oil supply system.

As an alternative, the existing package boiler could be completed and activated as a low-pressure boiler, in case this is technically feasible.

However, in order to be on the safe side, a new package boiler has been accounted for in the reactivation investment budgets.

For Model C: HP-steam will be generated with the recovery boiler and the power boiler.

Low pressure process steam is taken from the steam turbines, the LP-package boiler used in Model B will become redundant.

3.3.4. Buildings and Civil Works

For Model B: The civil works portion provides for the patch-up work on the paper machine hall, all the concretechests (incl. lining) and other structures for process machinery (incl. grouting), railings etc.

The raw water pumping station needs clean-up and repair work; the primary effluent clarifier appears to require only minor repair. The pumping station of the effluent will need a protective roof.

The new diesel generator set, as well as the new package boiler will be located on new concrete platforms, and in a simple shack type structure.

The townsite, at least parts of it, is to be renovated, repaired, refurnished and connected to water supply, effluent disposal and electricity.

For Model C: Basically, all mill buildings and structures as well as the townsite must be finished.

3.3.5. Organizational and Manpower Requirements

The estimates of the manpower requirements have been established taking the particular location of the mill into account.

Personnel requirements for the forestry operations are not included here, as they are covered in the wood costs.

For Models B and C, the following numbers of manpower requirements have been established:

Dept./Section	Model B	Model C
General management	3	3
Quality control unit	24	27
Administration	114	114
Finance	32	32
Commercial	42	42
Maintenance	126	181
Production	237	451
Total mill	578	850

(for detail vide Annex 4.3.-2)

It has to be borne in mind, however, that all the administration and operational personnel has to be recruited and properly trained well in advance of the mill's start-up.

3.3.6. Tentative Schedule for Implementation

A combined time schedule for the consecutive implementation of the Models B and C has been developed. The corresponding capacity utilizations of the paper machines, and the pulp dryer are correlated as follows:

	Model B					Model C		
year	1	2	3	4	5	6	7	8
Paper machine 1 production* (%)	0	0	60	85	85	85	85	85
Paper machine 2 production* (%)						60	85	85
Pulp dryer production* (%)						50	75	90

*% of design capacity of the machines

When tackling the model B, the following activities require effective implementation and detailed time scheduling:

1. Contracts with vendors to establish detailed rehabilitation budget

2. Site survey by main vendors

3. Contracts with vendors for rehabilitation and additional equipment

4. Period for rehabilitation work and additional equipment supply

4.1. Housing and civil works
4.2. Equipment rehabilitation
4.3. New equipment supply
4.4. Shipment, erection

5. Start-up and commisioning

Model C:

The activities for the completion of the pulp mill and its auxiliaries are considerably more extensive than for Model B but the erection can be realised virtually without inter-

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ference with the production activities of Model B.

A full scale erection management will be required.

The following tentative list of main activities would require careful detailed scheduling:

Activity:

1- Negotiations and contracts with construction and erection contracting groups, local and expatriate

2- Formation of site management organisation and staffing

3- Contacts with vendors to establish detailed rehabilitation budget, incl. expatriate commissioning personnel

4- Site survey by vendors to establish condition and completeness of existing equipment and needs for additional equipment.

5- Checking of basic engineering and completion of detail engineering (at vendor's home offices and at site office)

6- Contracting of additional or replacement equipment

7- Supply of replacement and new equipment, spare parts, etc

8- Completion of equipment erection and civil construction incl. tonwsite housing and facilities

9- Start-up and commissioning completed.

4. Assessment of Impact of Reactivation

4.1 Method of Approach and Main Assumptions

The financial and economic assessment takes into account the proposed technical and organizational concept and follows the tentative implementation plan (vide 3.3.6).

The analysis covers a total period of 17 years starting in 1991 and including all implementation works. The re-activation plan calls for commissioning of Model "B" (paper line) in 1993, while the pulp production is proposed to start in 1996. The economic project life of the rehabilitated paper line is 15 years, i.e. ending in 2007.

The assessment assumes further that production and sales of printing and writing paper will meet the planned level of operation within two years while the production of bleached short fiber pulp is expected to require three years.

The calculation of the internal rate of return is made in real terms. It is assumed that the 1990 constant prices do reflect the real price and cost level. Inflationary effects may be judged upon by the sensitivity analysis.

The assessment of the re-activation is further based on 340 working days per annum and a three shift operation. Average capacity utilization has been assumed at 85% for the paper mill and at 90% for the pulp mill. The paper production is expected to reach this level in the second year, the pulp mill in the third.

4.2 Investment Costs and Financing

4.2.1 Investment Costs

The investment costs for re-activating Iwopin Paper Mill are summarized in table 4.2-1. Further details are provided in Annex 4.2-1. They consist mainly of

- pre-operational expenses
- fixed investment and
- working capital requirements

The estimated capital expenditures for the additional machinery and equipment are current 1990 prices. They include price and quantity contingencies of 5 - 10%. The prices of major items have been established on the basis of quotations from the machinery suppliers. Import duty of 10% for all investments before 1993 and 15% thereafter have been taken into account. They total US $ 16.9 million. The costs of civil works and local inputs follow the estimate of the Parsons and Whittemore Organization of 1987 but have been inflated by an average annual price escalation rate of 12%. The delayed re-activation of the pulp mill requires to convert the 1990 capital costs first into current terms by applying an average annual price escalation rate of 4.8%. The current term projection is then deflated by a general deflator of 3.5% p.a. to convert the nominal terms into real terms.

The projected working capital requirements are based on the following conditions:

- local material stock	1	month
- imported material in stock	3	months

- work in process	10	days
- finished products	1	month
- trade debtors	30	days
- trade creditors	30	days
- cash requirements	30	days

4.2.2 Financing

The tentative financing scheme considers a 50% state capital injection with total capital costs (including working capital) of about US $ 310 million. This requires:

- equity financing of US $ 155 million
- loan financing of US $ 155 million

The loan financing is split in two components:

- loan 1 of US $ 38 million
  - . interest rate 26.5%
  - . repayment period 12 years

- loan 2 of US $ 117 million
  - . interest rate 15%
  - . repayment period 15 years

4.2.3 Summary of Investment Costs

The estimated total investment is summarized in table 4.2.3-1. It reflects preinvestement expenses of US$ 32 million and initial capital expenditures of US$ 57.2 million for the paper mill and US$ 186 million for the pulp mill.

Table 4.2.3-1: Investment Summary (1000 US$)

Ivopin Paper Mill-Phased Re-activation:			Erection	Erection	--Model'B'--	--Model'B'--	--Model'B'--	--Model'C'--	--Model'C'--	--Model'C'--	
Investment			1990	1991	1992	1993	1994	1995	1996	1997	1998
Pre-operational Expenses											
Engineering Consultancy		0	0	214	217	0	11,956	5,188	0	0	0
Management Consultancy		0	0	0	0	0	4,058	9,588	0	0	0
Training		0	0	0	0	0	0	887	0	0	0
Pre-operational Expenses			0	214	217	0	16,014	15,663	0	0	0
Fixed Investment											
Buildings and Civil Works		0	0	4,287	4,340	0	3,039	3,077	0	0	0
Machinery and Equipment		0	0	33,946	14,731	0	111,872	68,567	0	0	0
Furniture & Office Equipment		0	0	0	0	0	0	0	0	0	0
Vehicles and Boats		0	0	0	0	0	0	19,868	0	0	0
Machine Tools		0	0	0	0	0	0	0	0	0	0
Fixed Investment		0	0	38,233	19,071	0	114,910	71,491	0	0	0
Working Capital Change											
Material in Stock			0	0	8,768	3,653	0	(2,087)	1,669	461	0
Finished Goods Stock			0	0	0	3,694	1,401	37	2,181	1,845	794
Work in Process Stock			0	0	0	1,090	445	6	564	566	253
Trade Debtors			0	0	0	3,732	2,022	194	3,173	2,806	1,153
Trade Creditors			0	0	0	3,047	1,270	(0)	(1)	947	361
Cash Requirements			0	0	0	447	131	37	182	148	36
Working Capital Built-Up			0	0	8,768	9,370	2,729	(1,813)	7,770	6,876	1,874
TOTAL INVESTMENT			0	38,447	28,057	9,370	133,656	85,342	7,770	6,876	1,874
F I N A N C I N G											
State Capital			0	0	37,937	0	0	116,808	0	0	0
Loan Financing			0	37,937	0	0	116,758	0	0	0	0
TOTAL FINANCING			0	37,937	37,937	0	116,758	116,808	0	0	0

4.3 Financial Project Appraisal

4.3.1 Revenues and Costs (for details refer to Annex 4.3)

4.3.1.1 Revenues

Sales revenues are based on the following current 1990 CIF Lagos prices .

Table 4.3.1-1: Product Prices

Product	Quality	Application	Unit	CIF Lagos Price 03/90	Import Duty	Ex-Factory Price	
						Nigeria	Export
P+W Paper	Lower Grade Wood Containing	Exercise Book Computer Paper School Books	US $/mt	900 - 1029	15%	920	
P+W Paper	Higher Grade Woodfree Surface-sized	Stationary Copying Paper	US $/mt	1100 - 1250	15%	1100	
Pulp	CP Bleached, Short Fiber		US $/adt	700 - 750	10%		450
	CP Bleached, Long Fiber		US $/adt	800 - 850	10%	No Local Production	

The sales volume is calculated by elimination changes of stocks from the planned production output.

4.3.2 Costs

(1) Material Costs

The financial analysis considers the following unit costs of the major materials as quoted in March 1990 in Nigeria (for further details refer to Annex 4.3-1).

Table 4.3.1-2: Material Costs

Material	Unit	Material Costs at Paper Mill	Import Duty
Gmelina Pulpwood	US $/ m^3	24	-
Sodiumcarbonate	US $/ t	456	
Caustic Soda (NaOH)	US $/ t	760	-
Sulphur	US $/ t	823	-
Sulphuric Acid(H2SO4)	US $/ t	575	-
Sodium Chloride(NaCl)	US $/ t	152	-
Salt Cake (Na2SO4)	US $/ t	247	30
Lime Stone	US $/ t	99	-

Material	Unit	Material Costs at Paper Mill	Import Duty
Bl LF Chemical Pulp	US $/ t	910	85
TMP Pulp	US $/ t	682	62
Bl SF Chemical Pulp	US $/ t	800	75
China Clay	US $/ t	616	123
Size	US $/ t	1455	242
Alum	US $/ t	500	-
Starch	US $/ t	886	-

Source: suppliers in Lagos

(2) Personnel Costs

The projected payroll estimate of Iwopin Paper Mill include salaries and wages as well as social benefits and housing allowances payable in Nigeria. Expenditures for uniforms and medical care have been accounted for separately. A summary of the mill's annual payroll is given below. For further details refer to Annex 4.3-2.

Department	Payroll (1000 Naira p.a.) Model "B"	Model "C"
General Manager's Office (1)	519	555
Production	2,612	4,958
Maintenance	1,819	2,686
Administration	1,631	1,631
Finance	1,181	1,181
Commerce	884	884
Total	8,645	11,895

For the transportation of workers the costs of about Naira 105,000 has been taken into account.

(3) Utilities and Services

Utilities and services comprise mainly to the following items:

- electric energy
- process steam
- process and sanitary water
- repair and maintenance services.

In the case of **electric energy and steam** supply Model "B" and Model "C" implies two supply concepts: for Model "B" electricticity is produced by the diesel generators while

the steam supply is separately arranged via the steam block. In Model "C" the high pressure steam drives the steam turbines and is then fed into the pulp and paper production.

The relevant consumption rates are given below for both Models:

Model "B"

Electric Energy
Supply via diesel generator
Requirements:

- paper production	800 kWh/ft of paper
- others	50 kWh/ft of paper
- diesel equivalent	0.3 kg of diesel/kWh

Process Steam
Supply via steam block
Requirements:

- paper production	2.5 t of steam/ft of paper
- steam equivalent	14.0 t of steam/t fuel oil

Model "C"

Electric Energy and Process Steam
Supply via HP steam boiler and steam turbine
Requirements:

- slush pulp	0.219 t of fuel oil/bdt pulp
- dried pulp	0.340 t of fuel oil/bdt pulp
- paper	0.155 t of fuel oil/bdt pulp
- others	0.020 t of fuel oil/bdt pulp

The diesel and fuel oil prices are Naira 375 per ton of diesel and Naira 424 per ton of fuel oil in March 1990.

Process and sanitary water refers to the following specific consumption rates:

- process water pulp line	60 m³/bdt of pulp
- process water paper line	25 m³/ft of paper
- sanitary water	0.025 litre/employee and day

Since the water is supplied from the mill's own pumping stations, the relevant costs comprise basically the operation of the pumping system and the water treatment. The financial analysis considers average unit costs of Naira 10 per m3 of water.

Repair and maintenance costs consist in addition to the salaries and wages included under personnel costs, spare parts and consumables as well as any contract works. They are estimated at US $ 40 per ton of finished paper for all processing machinery and equipment. For buildings and transport equipment the following percentage of their initial cost has been taken into account to cover the recurrent annual expenditure.

- buildings	1%
- vehicles and barges	3%

(4) Insurance

The scope of the insurance coverage and the basis for estimating the premium in Nigeria are summarized below:

Type of Insurance	Coverage	Premium Rate	Premium Basis
Industrial all risks	o flood, hurricane earthquake o riot, strike etc.	0.15%	replacement value
Empoyer's Liability	o employer's legal liability to employees	0.25%	payroll
Motor Vehicle, Barges	o loss, damage by fire, lightning, accident, theft, etc.	5.0%	replacement value

(5) Depreciation

Depreciation is charged on the straight line basis at the following annual rates which are applicable in Nigeria:

- building and civil works	4%
- Machinery and equipment	5%
- vehicles	20%
- furniture and office equipment	20%
- loose tools	25%
- pre-investment	33%

(6) Overhead Costs

Overhead costs comprise mainly:

- administration
- selling and distribution

The administration expenses represent about 3% of total operational costs. For further details refer to Annex 4.3.2-1.

(7) Financing Terms and Conditions

The *lending terms and conditions in Nigeria* reflect the high inflation which officially declined from 51% in June 1989 to 18.5% in June and 15% in September 1990. But the manufacturers claim that inflation is still around 24%. Interest rate, though varying from one bank to the other, can be assumed in the range of 26.5% to 29.5% in November 1990. This is based on a prime rate of 25.5% and assumes a margin of 1% to 4%.

Moratorium and repayment period depend very much on the projected cash flow. Nevertheless commercial banks are more interested in short and medium term lending. This refers to repayment periods of 1 to 2 years and 3 to 7 years respectively. Anything beyond 10 years is not attractive to them. But United Bank of Africa can conveniently allow for 10 years repayment provided that the cash flow verifies satisfactorily that repayment can be expected about 2 years after the loan disbursment.

The following *terms and conditions* have been assumed *for financing the re-activation package*:

-	loan 1 of	US $ 38 million
	. interest rate	26.5%
	. repayment period	12 years
	. grace period	2 years
-	loan 2 of	US $ 119 million
	. interest rate	15%
	. repayment period	15 years
	. grace period	2 years

(8) Taxation

A profit tax of 45% is charged to the taxable net surplus. Losses generated during the initial years have been carried forward.

4.3.3 Financial Contribution Margins

The difference of product price minus direct costs has been defined as the unit contribution margin. The direct costs are the expenses per product unit for raw materials, chemicals, additives, electric energy and steam. The contribution margin per product unit allows to establish the financial contribution related to a specific production volume. A disadvantage, however, is that the margins of products with different capacity rates are not directly comparable. This again is vital to identify the favourable product or products.

The financial contribution capacity (FCC) is the contribution generated by a product in a specified period of time and based on the available production capacity. It is the difference between revenues and direct costs. Hence, the costs are determined by multiplying the unit rates with the production capacity. The financial contribution capacity allows - other than the margin per product unit - to compare products with different output rates. To ease the analysis, the results are plotted in form of a stacked bar graph.

Figure 4.3.3-1 reflects a favourable contribution capacity of locally produced pulp and its paper. Thus from this point of view there is a clear vote for Model "C". But the final decision must also take into account the required capital investment for commissioning the pulp production (for details refer to Annex 4.3.3-1). The relatively low contribution margin of short fibre pulp must be related to the low product price, a result of the currently depressed world market situation.

Figure 4.3.3-1: Analysis of Contribution Margins

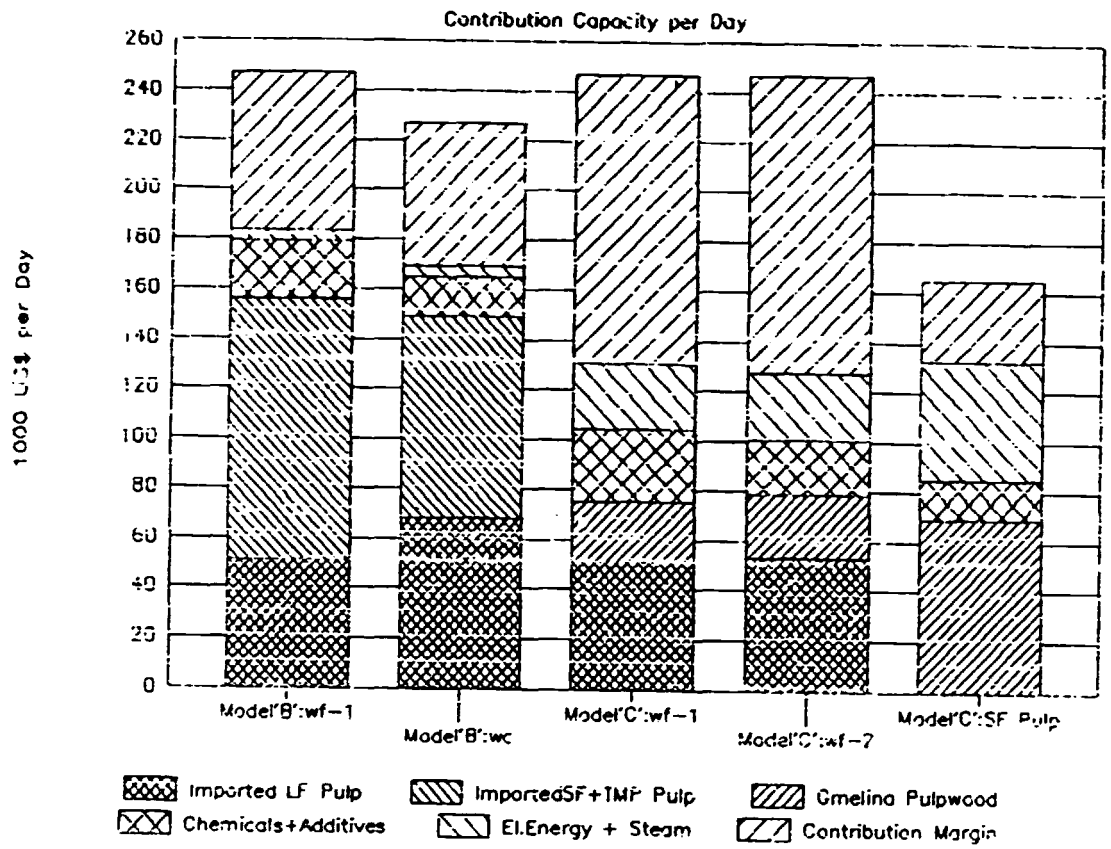


Table 4.3.3-1 compares the contribution margins per product unit and the contribution capacities. The FCC is based on a capacity of 122 adt of pulp and 67 mt of paper per shift.

Table 4.3.3-1 Financial Contribution Margins

Model	Pulp/Paper Grade		Margin Per Product Unit US $/t(1)	FCC US $/Day
"B"	wood-free 1	(wf-1)	317	63,419
"B"	wood-containing	(wc-1)	288	57,580
"C"	wood-free 1	(wf-1)	582	116,431
"C"	wood-free 2	(wf-2)	600	119,700
"C"	Bl sf ch pulp		89	32,510

(1) paper: US $/ t. pulp: US $/adt

4.3.4 FNPV and FIRR

The calculation of the net present value (NPV) and the financial rate of return (FIRR) follows the specific assumptions and the method outlined below:

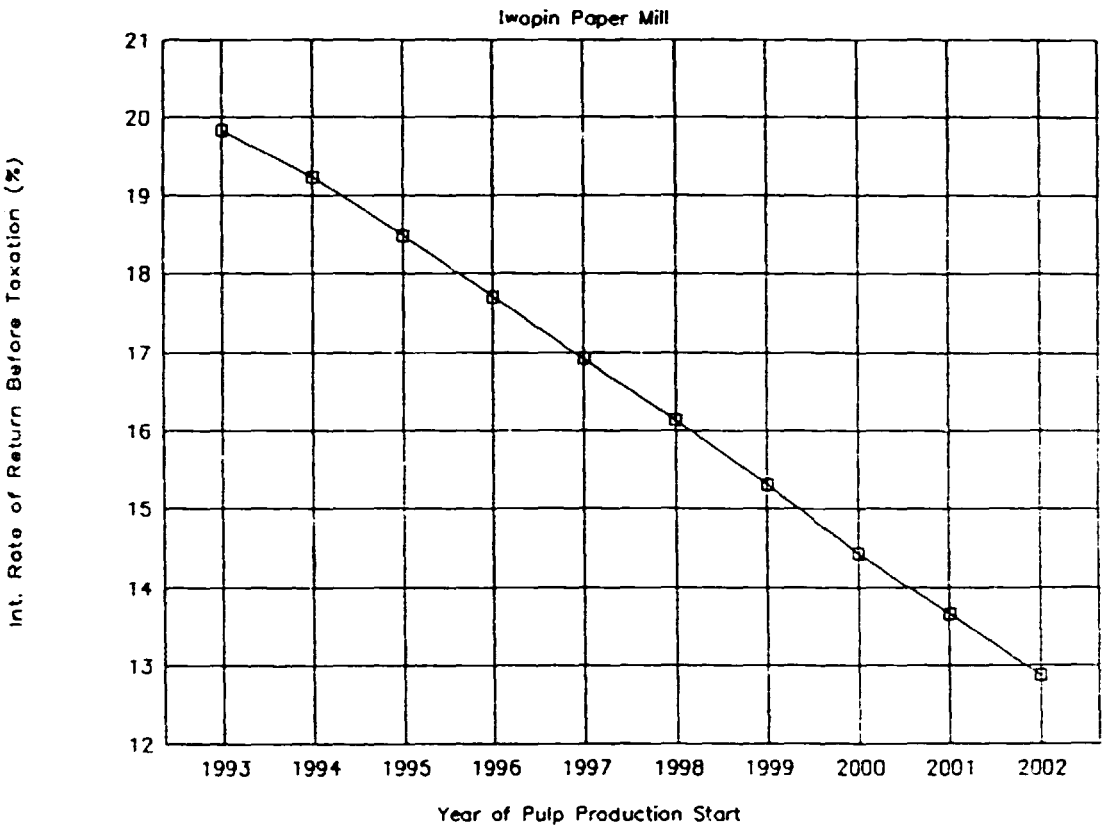
- the calculation applies the sunken cost approach
- the time period for the analysis is 17 years. It includes two years for implementing for the plant.
- the calculation is done in real terms based on 1990 prices.
- at the end of the projection period, the accumulative built-up working capital is assumed to be recovered in cash
- the residual value of the plant is considered to be zero for the paper line. This is rather conservative since the expected machinery life of the main machinery and equipment is over 20 years.
- in case of the pulp line a residual value corresponding to the balance of economic life (15 years) and actual usage has been considered. This is of particular importance if the effects of postponing the commissioning of the pulp mill are investigated.
- the net present value is computed for a discount rate of 10%

4.3.4.1-Analysis of Pulp Production Impact

The analysis of the different contribution margins demonstrated a clear advantage of locally manufactured pulp. This, however did not take into account the capital requirements. In the following the pulp production impact is examined by computing the financial rate of return. In a sensitivity test the commissioning of the pulp line is stepwise moved from 1993 to 2002. If pulp for instance is to be produced in 1993, Model "C" would have to be implemented immediately.

The graph below illustrates the benefit of implementing Model "C" as early as possible. The proposed re-activation concept considers commissioning of the pulp mill in 1996. The corresponding FIRR is 17.7%.

Figure 4.3. .1: FIRR and Pulp Production Impact



4.3.4.2 FNPV and FIRR - Base Case

The base case assumes the commissioning of one paper line in 1993 and the start of the pulp production in 1996. The anticipated sales of printing and writing paper total 115 6 tons annually. The financial rate of return has been computed at 17.7%. The net present value at 10% is US $ 107.4 million. The cash flow for computing the FIRR is contained in Annex 4.3.3-1.

4.3.4.3 Sensitivity Analysis - FIRR

In addition to the calculation of the FIRR for normal conditions (base case) the effects of reduced/increased, paper prices, pulp and pulpwood costs, salaries and wages, energy, capacity utilization and investment costs have been analyzed. The financial rates of return are listed below.

Table 4.3.4.3-1: Sensitivity Analysis - FIRR

Iwopin Paper Mill-Phased Re-activation:
Planned Plant Commissioning Year
Model'B': 1993
Model'C': 1996

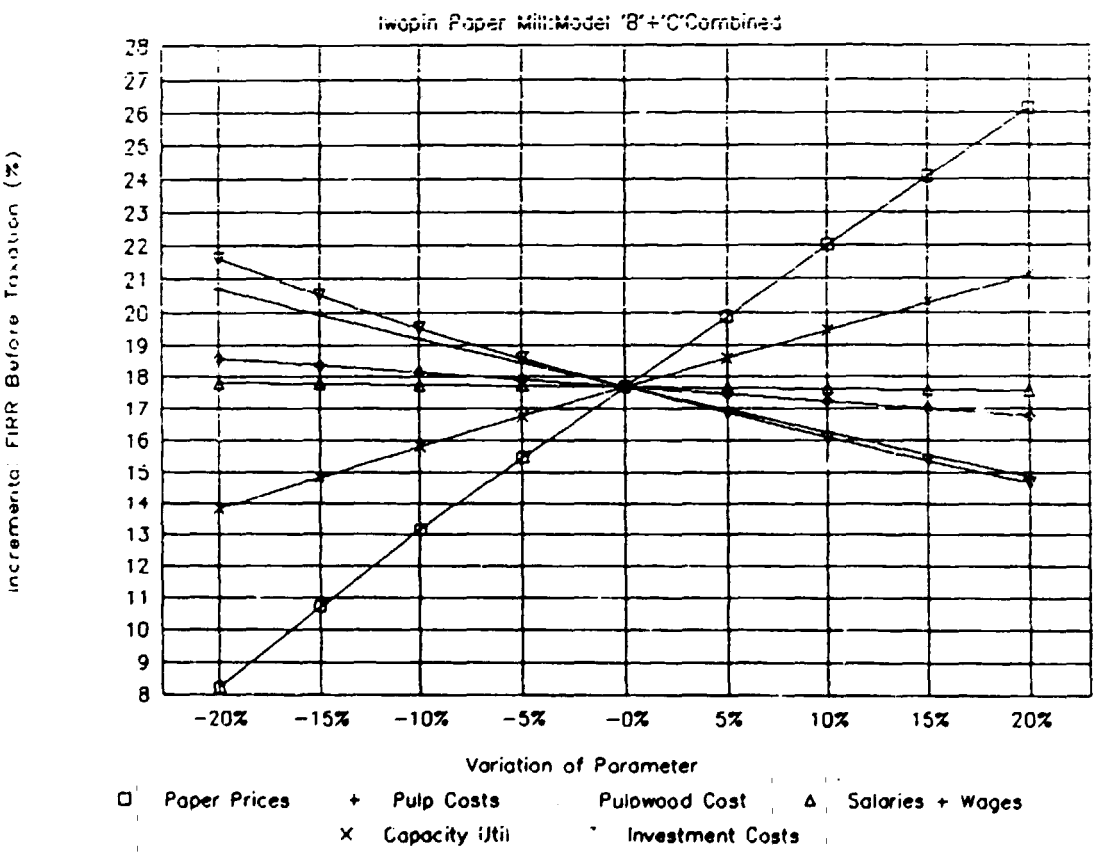
Parameter	-20%	-15%	-10%	-5%	-0%	5%	10%	15%	20%
Paper Prices	8.2	10.7	13.1	15.5	17.7	19.9	22.0	24.1	26.1
Cost of Imported Pulp	20.7	19.9	19.2	18.4	17.7	17.0	16.3	15.6	14.9
Pulpwood Cost	18.6	18.4	18.1	17.9	17.7	17.5	17.2	17.0	16.8
Salaries and Wages	17.8	17.8	17.8	17.7	17.7	17.7	17.6	17.6	17.6
Cost of Energy	17.8	17.8	17.8	17.7	17.7	17.7	17.6	17.6	17.5
Capacity Utilization	13.8	14.8	15.8	16.8	17.7	18.6	19.4	20.3	21.1
Investment Costs	21.6	20.5	19.5	18.6	17.7	16.9	16.1	15.4	14.7

The results of the sensitivity analysis may be summarized as follows:

- the FIRR reacts highly sensitive to changes in paper prices and the the capacity utilization respectively sales volume.
- changes in pulp or pulpwood costs and investment costs have only a marginal impact on the profitability
- the effects of variations in personnel or energy costs can be neglected.

The following graph illustrates the sensitivity of the FIRR to the key performance parameter.

Figure 4.3.4.3-1: Sensitivity Analysis - FIRR



4.4 Projected Finances

The projection of finances covers the period from 1993, the year of commissioning the paper production, until 2007. All calculations are made in constant 1990 prices. They comprise:

- Profit and Loss Account
- Cash Flow for Financial Planning and
- Balance Sheet

The projections follow the specific assumptions and the method outlined below:

- all long and short term liabilites are maintained at their level as of 31.12.1989
- the projections are made in US $ to compensate the effects of the domestic inflation to some extent
- the assets and liabilites as of 31.12. 1990 have been converted to US $ by using an average exchange rate of 1:1.[1] This might be on the lower side considering that the average exchange rate varied from 1.5 US $ per Naira in 1977 to 1 US $ per Naira at the beginning of 1986 (for details refer to Annex A-4.4-0). However it takes also into account the current status of the equipment. Further it has the advantage to provide an easy reference to all local loans. Since these loans are not serviced there is not the problem of calculating the financial charges.

(1) Profit and Loss Account

Details of the profit and loss account are contained in Annex 4.4-1. The projection confirms the vital impact of the pulp production. Accordingly the project is expected to generate a positive net surplus only after commissioning of the pulp mill (Model "C"), i.e. from the year 2000 onwards. The delay must mainly be attributed to the high depreciation allowance and the heavy financing costs. Thus the financial performance of the pulp and paper mill is very much related to the share of equity financing and the actual lending terms and conditions.

(2) Cash Flow for Financial Planning

The detailed cash flow for financial planning is attached in Annex 4.4-2. The forecast demonstrates once again the heavy burden of the loan lending costs: a cash surplus from operations is projected from the second production year (1994) onwards, while the cash flow after debt services turns positive only in 1995. The accumulated deficit has been absorbed by the accumulated cash surplus in 1999.

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1 In the past, the fixed assets have been converted from US $ to Naira by the average exchange rate during the purchase time, i.e. mainly from 1977 to 1983. No distinction was made between local and foreign costs. Thus, it would actually be required to convert the fixed assets into US $ on the basis of the actually applicable exchange rate in order to provide for a realistic depreciation allowance, since all other operational costs are extremely inflated.

(3) Projected Balance Sheet

The detailed balance sheets can be seen in Annex 4.4-3. It reveals a worsening debt/equity situation due to the accumulation of losses during the initial production years. The same holds true for the company's working capital position.

4.5 Break-Even Analysis

The break-even analysis is carried out for the entire project period by splitting the operational costs into their fixed and variable elements. The computed results are contained in Annex 4.5-1. Accordingly the project is operating initially above its break-even level. In 1999 this level drops to 86% and from there declines steadily down to 51% in 2007 due to declining interest costs and depreciation allowance.

5. CONCLUSIONS

The conclusions to be drawn from the results cover

a) technical and
b) financial subjects.

On the technical side it can be concluded, that all major departments are equipped with machinery of first class manufacture, all designed for rigid operation conditions and reliable performance.

As far as the technical condition of this equipment goes, the only way to obtain really reliable information on the reconditioning and refubishment costs is to have specialists of the main suppliers engaged to do the appraisal work, and have their appraisal reconfirmed by an independent technical institution, like the German TüV, or similar.

On the financial side it becomes apparent, that without the application of the "sunken cost approach", the reactivation project would not be viable.

It is to be noted that on top of the large amounts already spent up to now, considerable funds would have to be allocated to reactivate the Iwopin project.

A further important conclusion must be drawn regarding the wood supply situation, i.e. the plantation of Gmelina arborea trees. Presently, it is at an insufficient minimum, which would result in a wood shortage after approximately 10 years of mill operation.

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6. RECOMMENDATION

The following main recommendations apply:

a) The stepwise reactivation should be adopted, for the following reasons:

-It is technically and economically feasible.

-It is a considrably less demanding task and thus has better chances to be successfully implemented than the whole-mill-one-step-approach.

-The first step (Model B) requires lower investments, i.e. it will be easier to raise such funds.

-The success of the first step (Model B) will provide the basis for Model C, i.e. once it has been proven that a part of the mill can be made operable, a raising interest and readiness to invest into its completion can be expected.

b) Parallel to this, attempts should be made to interest a large international pulp and paper manufacturing company to take over the project, complete and manage it.

This probably would mean privatization of the enterprise, with all its consequences.

c) As soon as the principal decision to further follow-up the project has been taken,

-the detailed appraisal of reconditioning requirements by main suppliers specialists, and

-the reactivation of plantations

should be implemented.

P-5108/03.6-2

A N N E X E S

P-5108/03.6-2

Annex A - 1

TERMS OF REFERENCE

FOR A CONTRACT FOR

HIGH LEVEL ADVISORY SERVICES ON THE REACTIVATION OF

THE NIGERIAN NATIONAL PAPER MANUFACTURING COMPANY LTD. IWOPIN PAPER MILL

Phase II

1. Project Objective

The project objective is to assess the existing status of the IWOPIN Paper Mill with a view to providing the Federal Government of Nigeria with adequate information on the technological and financial requirements to put the Mill into full operation.

2. Background and Justification

In 1975, at a time when the overall performance of the economy and the growth of the manufacturing sector were impressive as a result of the oil boom, the Federal Government of Nigeria took a decision to establish three paper mills in the country, namely, The Nigerian Newsprint Manufacturing Company Ltd., The Nigerian Paper Mill ltd. and the Nigerian National Paper Manufacturing Company Ltd., otherwise known as the IWOPIN Paper Mill.

The Nigerian Paper Mill, situated in Jebba, Kwara State, specializes in the production of industrial grades of paper and exercise books and, as the name implies, the Nigerian Newsprint Manufacturing Company Ltd. in Oku-Iboku, Cross River State, was designed mainly for the production of newsprint for newspapers. The Nigerian National Paper Manufacturing Company Ltd. at IWOPIN, Ogun State, was designed to produce cultural grades of bleached fine paper, utilizing local short fibre of bleached pulp blended with imported long fibre pulp and bleached short fibre pulp sheets estimated at about 200 tons and 160 tons per day respectively. The IWOPIN Paper Mill was expected to have its own chemical plant, capable of producing the required caustic soda, chlorine dioxide, hydrochloric acid and hypochlorite.

Whereas the paper mill at Jebba and Oku-Iboku were installed and are now operational, the IWOPIN Paper Mill has not been fully installed and commissioned.

The IWOPIN Paper Mill is jointly owned by both the Federal Government and the three State Governments of Ogun, Ondo and Oyo, with the Federal Government holding 86.56 % of the share capital of 140 million Naira and the remaining 13.454% owned in equal ratio of 4.5 % by the State Governments.

The estimated cost of the mill in 1988 was 576.32 million Naira. At the initial stage of the project approval very little could be achieved because of financial constraints which were slightly alleviated through the provisions of an off-shore loan raised by Messrs Birla Brothers of India, the management consultants for the IWOPIN project. In addition, the Government made some other releases of funds. By 1985, a total of about 297.37 Naira has been released with a balance of about 278.95 million Naira which has since escalated as a result of costs and Government's inability to mobilize sufficient domestic and foreign resources to complete the work, install and commission the various plants and equipment.

The above mentioned problems were brought to the attention of UNIDO during the Director General's visit to Nigeria and it was agreed that UNIDO would send a staff member on a fact finding mission to determine what eventually could be done to assist the Government in its efforts to complete the installation of and put into operation the plant and equipment

The mission noted that the facilities at IWOPIN consists of inter alia a wood yard, five 190 cubic meters stationary digesters, 3 brown stock washers and a cehed pulp bleaching line. In addition there are two 5 m wide Escher-Wyss paper machines, three boiler plants and four electricity diesel generators of 640 kw each. It was also noted that most of work had been done in the mill in respect of the civil engineering, construction and installation of plant and equipment is about 75 % finished. It was revealed by the authorities that some preliminary assessment of the costs involved to finish construction, installation and commissioning of the plant was done by a company, messr. Parson and Whittemore of London, which estimated that the cost could be approximately over US 200 million off-shore and about 1 billion Naira.

The mission recommended that the Government should endeavor to finish and put into operation; (i) the paper converting plant with national or international partners to produce sheeted printing and writing paper from imported rolls (ii) the caustic soda/chlorine plant. It was also recommended that the Government should assess the viability of selling one of the Escher-Wyss paper machines or leasing them to interested partners in neighbouring states preferably to Cellucam in Cameroon.

Given the enormous resources already spent on the IWOPIN Paper MIll project and its strategic role in the country's development in that once operational it could supply the domestic market with adequate cultural grade of writing and printing papers and eventually pulp which could be utilized by small-scale paper producing units throughout the country as well as for exports to other countries, the Federal Government would like to take a decision on the activation of the paper mill based on a independent assessment specifying the technical and financial implications of rehabilitating the paper mill at IWOPIN.

In the light of the above, the Government has requested UNIDO's technical assistance, as indicated in the letter from the Honourable MInister of Industries, dated 9 August 1989, a copy of which is attached to the project document.

Hans Rahm, Ingenieurplanungs AG, Maennedorf, Zurich, Switzerland (HRAG) was contracted for the execution of the work in two Phases, as described in 3.

Phase I was completed and the conclusion was that the mill has one chance to be economically reactived by a stepwise approach, starting with the temporary operation of one paper machine using puchase pulp, drawing power from diesel generators and steam from a steam block. The estimated additonal investment will be approx. US$ 45,000,000 and will have a FIRR (financial internal rate of return) of nearly 16 % before taxes. Based on this result our recommendation is to start Phase II of the project.

3. The Contractor's Responsibility

The main task to be completed by the contractor will be a comprehensive technical and economic assessment of the IWOPIN Paper Mill with recommendations to determine the viability of reactivating the project as originally planned.

This will be achieved through a two-phase investigation program:

Phase I Consists of a first overall technical and financial assessment of:

a) the general condition of mill equipment, buildings and infrastructure, i.e. are they still suitable for the project reactiviation, or is too much lost by deterioration.

b) the stepwise approach of reactivation, and the respective conditions.

ALREADY DONE

Phase II consists of:

a) consolidation of the findings of phase I, as far as the first step of the mill operation is concerned, and

b) the assessment of technical and financial implications involved in getting the whole project, i.e. including pulp mill and foresting operative.

The following work sections will be performed, within the two Phases:

(i) Review and assessment of the mechanical status of the equipment and the degree of completeness of erection of equipment.

(ii) Assessment of the plants capacities on basis of availability of raw materials.

(iii) Brief overall assessment of the availability of fibrous and other raw materials as well as the products market situation.

(iv) Evaluation of the design and structure of the various plant sections, inspection of plants and assessment of technical requirements to complete construction of the mill in a stepwise approach.

(v) Review and assessment of plans for the structures and civil engineering work including cost estimated to complete construction.

(vi) Evaluation of the present and propositions to future organizational structures of the IWOPIN Paper Mill to determine the requirements
- to complete the reactivation,
- to operate the mill sections,
- to operate raw materials supply and product marketing.

(vii) Evaluation of the financial requirements including analyses of debt service ratio, total debt coverage to determine investment cost projected annual investment expenditures, working capital requirements, etc. to complete and put into operation the IWOPIN Paper Mill.

(viii) If no stepwise reactivation appears advisable, assessment of alternative options available to the Government including the possiblities of extending equity participation to nationals and neighbouring states, or sale of some plants, machinery and equipment.

(ix) Prepare reports on the basis of the above with specific recommendations on the reactivation of the IWOPIN Paper Mill, for both phases I and II.

4. Services of the Contractor

(i) The contractors team will consist of:

- 2-3 engineers with longstanding experience in pulp and paper mill design, construction and operation, including paper finishing/converting, chemical preparation and recovery, and steam and power generation. Knowhow in cost estimating also required. One of them is to be named as team leader.

- 1 forest specialist.

- 1 economist/financial analyst/market analyst

- a legal advisor may be chartered by the contractors locally, if the nessessity should come up.

(ii) A total of 7 m/m consulting input is envisaged. The split between field and home work is to be decided by the contractors team leader, in accordance with the requirements as determined during the implementation of the assignment.

(iii) The contractor is also expected to provide the services of other home based personnel and facilities as deemed necessary for supporting the contractor's team that is assigned to the project.

(vi) The contractor will work in close collaboration with the Federal Ministry of Industry and the Management of IWOPIN Paper mill project.

(v) The team leader of the contractor will visit UNIDO for upto two working days on each of the following:

- initial briefing: within a week from the date of the award of the contract
- intermediate reporting: after Phase I report submission
- intermediate reporting: 2 months after starting date of Phase II
- debriefing: on completion of the field work and preparation of the final report

5. Travel and Living Expenses

(i) The contractor will be responsible for the international travel and DSA of the members of the project team.

(ii) The contractor will cover the cost of internal air travel within Nigeria.

(iii) The contractor will also be responsible for the travel and DSA for the team leader's visit to UNIDO.

ESTIMATED WORK PERIODS

The work on Phase I should be carried out in approx. 2 months, and the work on phase II should be carried out within approx. 4 months.

Language of final report:	English
Number of copies to be supplied:	10 copies each of phase I and phase II
Date of delivery of final report:	2-3 months after completion of mission

P-5108/03.6-2

Annex A - 2.1

Annex A-2.1

Domestic Consumption of Printing and Writing Paper 1990

Paper Grade	Grammage (gsm)	Consumer		Annual Requirement (mt p.a.)	Import Price CIF Lagos (US$) March 1990		Source
		Name	Location		Reel	Sheet	
White Bond Paper	60 - 80	Apex Mill	Lagos	15,000	900	950	Finland or Brazil
	60 - 70	Onward Paper Mill Ltd.	Lagos	7,000	920 979	970 1029	Finland Brazil
		Omolayo Printing Ltd	Ondo State	4,000			
		Star Paper Mills		4,000			
		Star Modern Paper Mill		6,000			
		Other Printers and Publishers		54,000			
Subtotal				90,000			
Bank Paper	40 - 50	Apa Mill	Lagos	6,000	1,100	1,150	Finland or Brazil
	45, 50	Onward Paper Mill Ltd. Onward Stationaries	Lagos	3,000 2,000	1,200	1,250	Brazil
		Other Printers		9,000			
Subtotal				20,000			
Total				110,000			

P-5108/03.6-2

Annex A - 2.2.2

Table : PROJECTED AREA OF PLANTATION

Method of Harvesting	Clear Cut																
Gmelina Arborea	Age of Plantation	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Omo/Ogua	<10 Years	10,167	9,567	7,682	6,971	5,900	5,400	5,000	5,442	5,884	6,327	6,269	6,711	7,153	7,596	8,038	8,480	8,480
Obewa/Oado		9,772	9,548	8,248	6,475	5,500	5,000	5,000	5,365	5,730	6,095	5,959	6,324	6,689	7,054	7,419	7,784	7,784
Subtotal		**19,939**	**19,115**	**15,930**	**13,446**	**11,400**	**10,400**	**10,000**	**10,807**	**11,614**	**12,421**	**12,228**	**13,035**	**13,843**	**14,650**	**15,457**	**16,264**	**16,264**
Omo/Ogua	10 Years	1,000	1,600	2,385	1,211	1,571	1,000	900	500	500	500	1,000	500	500	500	500	500	942
Obewa/Oado		945	1,224	1,800	2,273	1,475	1,000	500	500	500	500	1,000	500	500	500	500	500	865
Subtotal		**1,945**	**2,824**	**4,185**	**3,484**	**3,046**	**2,000**	**1,400**	**1,000**	**1,000**	**1,000**	**2,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,807**
Omo/Ogua	16 Years	355	825	1,374	851	1,050	1,020	1,000	1,600	2,385	1,211	1,571	1,000	0	0	0	0	0
Obewa/Oado		56	436	450	1,160	914	985	945	1,224	1,800	2,273	1,475	1,000	0	0	0	0	0
Subtotal		**411**	**1,261**	**1,824**	**2,011**	**1,964**	**2,005**	**1,945**	**2,824**	**4,185**	**3,484**	**3,046**	**2,000**	**0**	**0**	**0**	**0**	**0**
Omo/Ogua	21 Years	218	330	660	270	710	355	825	1,374	851	1,050	1,020	0	0	0	0	0	0
Obewa/Oado		0	100	40	140	100	56	436	450	1,160	914	985	0	0	0	0	0	0
Subtotal		**218**	**430**	**700**	**410**	**810**	**411**	**1,261**	**1,824**	**2,011**	**1,964**	**2,005**	**0**	**0**	**0**	**0**	**0**	**0**
Omo/Ogua	25 Years and above	0	258	463	1,048	1,266	1,596	2,256	270	710	355	0	0	0	0	0	0	0
Obewa/Oado		20	40	40	90	90	190	230	140	100	56	0	0	0	0	0	0	0
Subtotal		**20**	**298**	**503**	**1,138**	**1,356**	**1,786**	**2,486**	**410**	**810**	**411**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Grandtotal		**22,533**	**23,928**	**23,142**	**20,489**	**18,576**	**16,602**	**17,092**	**16,865**	**19,620**	**19,280**	**19,279**	**16,035**	**14,843**	**15,650**	**16,457**	**17,264**	**18,071**

20	Table : CALCULATION OF PULPWOOD POTENTIAL						
21	Method of Harvesting	Clear Cut					
22	Input Data						
23			Final Cut				
24							
25	Cutting Year	Year	5	10	16	21	25
26	Standing Volume over Bark	m3sob/ha		200	320	420	500
27	Losses						
28	- Bark	% m3sob		20.0%	20.0%	17.5%	16.5%
29	- Harvesting Loss	% m3sob		7.5%	5.5%	6.5%	7.5%
30	Other Utilization of Wood						
31	- Timber (ssw logs, pols, etc)	% m3sub		0.0%	20.0%	50.0%	65.0%
32	plywood) max						
33	- Timber min	% m3sub		0.0%	10.0%	40.0%	60.0%
34	- Firewood max	% m3sub		30.0%	20.0%	15.0%	10.0%
35	- Firewood min	% m3sub		20.0%	15.0%	10.0%	10.0%

43 Table : SPECIFIC PULPWOOD POTENTIAL OF GMELINA ARBOREA

44

45 Method of Harvesting Clear Cut

46

47			Final CuT					
48		Unit						
49								
50								
51	Cutting Year		5	10	16	21		25
52								
53	Standard Volume over Bark	m3sob/ha		200	320	420		500
54	Losses							
55	- Bark	m3/ha		40.0	64.0	73.5		82.5
56	- Harvesting Loss	m3/ha		15.0	17.6	27.3		37.5
57	Total Losses	m3/ha		55.0	81.6	100.8		120.0
58	Volume Harvested under Bark	m3sub/ha		145.0	238.4	319.2		380.0
59								
60	Other Utilization of Wood							
61	- Timber max	m3sub/ha		0.0	47.7	159.6		247.0
62	- Firewood max	m3sub/ha		43.5	47.7	47.9		38.0
63								
64	Pulpwood min	m3sub/ha		101.5	143.0	111.7		95.0
65								
66	- Timber min	m3sub/ha		0.0	23.8	127.7		228.0
67	- Firewood min	m3sub/ha		29.0	35.8	31.9		38.0
68								
69	Pulpwood max	m3sub/ha		116.0	178.8	159.6		114.0

Table : PROJECTED PULPWOOD POTENTIAL - GMELINA ARBOREA (M3 SUB)

Method of Harvesting Clear Cut

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Minimum Pulpwood Potential																	
Clear Cut 10 Years	0	0	0	0	0	0	142,100	101,500	101,500	101,500	203,000	101,500	101,500	101,500	101,500	101,500	183,420
Clear Cut 16 Years	0	0	0	0	0	0	278,213	403,945	598,622	498,351	435,700	286,080	0	0	0	0	0
Clear Cut 21 Years	0	0	0	0	0	0	140,879	203,777	224,669	219,418	223,999	0	0	0	0	0	0
Clear Cut 25 Years	0	0	0	0	0	0	236,170	38,950	76,950	39,045	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	797,362	748,172	1001741	856,314	862,698	387,580	101,500	101,500	101,500	101,500	183,420
Maximum Pulpwood Potential																	
Clear Cut 10 Years	0	0	0	0	0	0	162,400	116,000	116,000	116,000	232,000	116,000	116,000	116,000	116,000	116,000	209,623
Clear Cut 16 Years	0	0	0	0	0	0	347,766	504,931	748,278	622,939	544,625	357,600	0	0	0	0	0
Clear Cut 21 Years	0	0	0	0	0	0	201,256	291,110	320,956	313,454	319,998	0	0	0	0	0	0
Clear Cut 25 Years	0	0	0	0	0	0	283,404	46,740	92,340	46,854	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	994,826	958,782	1277574	1099248	1096623	473,600	116,000	116,000	116,000	116,000	209,623

PULPWOOD POTENTIAL VERSUS SUPPLY

Method of Harvesting Clear Cut

Case'A': Minimum Pulpwood Potential							667,662	253,672	408,341	264,914	269,298	(205,820)	(491,900)	(491,900)	(491,900)	(491,900)	(409,980)
Case'B': Maximum Pulpwood Potential							665,126	464,282	684,174	505,848	503,225	(119,800)	(477,400)	(477,400)	(477,400)	(477,400)	(383,777)

P-5108/03.6-2

Annex A - 2.2.3

Sources and Prices of Chemicals

Chemicals	Source			Price March 1990 (Naira/t)		
	Import	Local	Local supplier	CIF Lagos US$/t	Ex-factory	Cost at Iwopin M.
Sodium carbonate (Na_2CO_3)	x			200 - 300		3'600
Caustic soda à 100% (NaOH)	x					5000-6000
Sulphuric acid à 100% (H_2SO_4)		x	Drury Industries Lagos		(2'900) 3'050	(2'950[2)]) 3'100
Lime stone ($CaCO_3$)		x	Marble Industry at Ajaokuta		450 (ex mine)	780
Sodium silicate liquid		x	Johne Edge & Company (Nig.) Ltd., Lagos			2'800

2) 850 Naira/t have to be added every fifth time for plastic jerry cans

Sources and Prices of Additives

Additives	Source			Price March 1990 (Naira/t)		
	Import	Local	Local supplier	CIF Lagos	Ex-factory	Cost at Iwopin M.
Alum		x	Drury Industries, Lagos		3'900[3] 4'500[4]	3'900[3] 4'500[4]
Rosin size	x		Germany	2'100 DM/t		11'500
Starch (cassava or maize basis)		x	there are many local suppliers		5'950- 6'950	6'000 7'000
	(x)			no import due to duty rate of 200%		
China clay	x			3'850		4'870
Wrapping paper (125 g/m^2)		x	Nigerian paper mill		10'943	11'250

3) kibbles
4) chips or powder

P-5108/03.6-2

Annex A - 2.3.2

Employment of Iwopin Paper Mill

	November 1987	February 1990
Management[1)]	2	2
Engineering, Workshop, Garage	14	31
Utility	9	
Drawing Office	5	
Electrical Workshop	15	
Civil Works	9	
Production/Warehouse	3	
Transport	16	11
Accounts	8	3
Stores/Purchasing	11	7
Personnel	12	11
Medical	3	2
Security	31	40
Fire Brigade	15	11
Secretary	2	-
Lagos Office	9	11
Total	164	129

Source: Iwopin Paper Mill 1) incl. chief accountant

P-5108/03.6-2

Annex A - 2.4

STATUS OF INSTALLATION ACTIVITIES UNDER
M & E CONTRACT (162-150)
(UPTO JUNE, 1983)

1.0 EQUIPMENT INSTALLATION

	Particulars	Withdrawal from store	Set on foundation	Initial alignment and levelling.	Final alignment and grout	Checkout and test
(a)	Estimated total (tons)	12,519	12,519	12,519	12,519	12,519
(b)	Installation status (as on 30/6/83)(tons)	8,760	7,601	7,046	5,845	110
(c)	Balance - Installation (Tons)	3,759	4,918	5,473	6,674	12,409

2.0 PIPING & ACCESSORIES — Details attached under Annex.I are being summarised below:

2.1 C. S. Piping - (above 50mm dia.)

(a) Estimated total = 29,452 Metres
(b) Installed = 506 Metres
(c) Balance installation = 28,952 Metres

2.2 S.S. piping - (above 50mm dia.)

(a) Estimated total = 32,177 Metres
(b) Installed = 300 Metres
(c) Balance installation = 32,177 Metres

2.3 Steam (65/12/4.5 Bar) Piping (above 50mm dia.)

(a) Estimated total = 766 Metres
(b) Installed = 66 Metres
(c) Balance installation = 700 Metres

2.4 All piping & Fittings below and upto 50mm dia.
(To be supplied and installed by M&E Contractor)

(a) Estimated total = 80,000 Metres
(b) Installed = 100 Metres
(c) Balance installation = 79,900 Metres

2.5 Hangers

(a) Estimated total = 9,367 Nos.

(b) Installed = 42 Nos.
(c) Balance installation = 9,345 Nos

Of the total requirement, 147 hangers for Power group steam piping are supplied by owner. Rest of the quantity to be supplied and fabricated by M&E Contractor

3.0 TANKS

3.1 Tanks for site assembly and erection:

	Particulars	Withdrawal from stores	Shake out Material & Check	Erect tank Plates	Weld out	Check out Test
(a)	Estimated Total(Tons)	1,487	1,487	1,487	1,487	1,487
(b)	Installation (as on - 30/6/83)(Tons)	1,420	1,387	1,193	592	NIL
(c)	Balance installation(Tons)	67	100	294	895	1,487

3.2 Tanks (Shop Fabricated) erection:

	Particulars	Withdrawal from stores	Set on foundation.	Grout	Check out and test.
(a)	Estimated total(Tons)	89	89	89	89
(b)	Installation status(as on 30/6/83)(Tons)	51	46	43	NIL
(c)	Balance - Installation (Tons)	38	43	46	89

4.0 INSULATION:

(a) Total estimated quantity = 47,301 sq.metres
(b) Installed = NIL
(c) Balance installation = 47,301 sq.Metres

5.0 REFRACTORY:

(a) Total estimated quantity = 320 tons
(b) Installed = NIL
(c) Balance installation = 320 tons

6.0 TILE LINING:

(a) Total estimated quantity = 157,320 sq.metres
(b) Installed = 800 sq.metres
(c) Balance installation = 156,520 sq.metres

7.0 INSTRUMENT PANELS & CONSOLE:

(a) Total estimated quantity = 79 Nos.
(b) Installed = NIL
(c) Balance installation = 75 Nos.

8.0 INSTRUMENT CABLE, WIRING & TUBING:

(a) Total estimated quantity = 2,663 Nos.
(b) Installed = NIL
(c) Balance installation = 2,663 Nos.

9.0 TRANSFORMERS & SWITCHGEARS:

Particulars	Withdrawl from stores	Instal Completely	Check out and test
(a) Estimated total (Nos.)	243	243	243
(b) Installation status (as on 30/6/83)(Nos.)	207	205	NIL
(c) Balance Installation(Nos.)	36	38	243

NOTE:- In addition to above, the control panels supplied alongwith the equipments are to be installed by the contractor.

10.0 MOTORS:

(a) Total estimated quantity = 938 Nos.
(b) Installed = 27 Nos.
(c) Balance installation = 911 Nos.

11.0 LIGHTING & POWER OUTLETS:

(a) Total estimated quantity = 5,189 Nos.
(b) Installed = 924 Nos
(c) Balance installation = 4,265 Nos.

NOTE:-

(i) Only Lighting fixtures to be supplied by the owner. All necessary wiring and conduiting shall be supplied and installed by contractor.

(ii) For out door lighting poles, cables etc. shall be supplied and installed by the contractor.

(iii) All lighting distribution panels and lighting transformers shall be supplied by the owner but installed by the contractor.

(iv) All power outlets including welding outlets shall be supplied by the owner.

(v) All switch, sockets for indoor lighting shall be supplied and installed by the contractor.

12.0 POWER CABLES & TRAYS

	Particulars	Withdrawl from stores	To instal support	To instal cable-tray	To pull Cable	Connections	Checks and te
(a)	Total - estimated (Metres)	17,890	17,890	17,890	17,890	17,890	17,89(
(b)	Installation status as on 30/06/83 (Metres)	3,980	3,980	3,980	NIL	NIL	NIL
(c)	Balance - installation(Metres	13,910	13,910	13,910	17,890	17,890	17,89

NOTE:-

(i) Only cable trays and all types of cables shall be supplied by the owner.

(ii) All Cable trays supports to be supplied and installed by the contractor. Supports for cables branching off from main cable trays to motors/equipments/control panels etc shall be supplied and installed by the contractor.

(iii) The quantities (running length) of cable trays are shown. Estimated quantity of diff. types of cables are as follows:-

(a)	1 KV Power Cables	-	211,000 metres
(b)	5 KV Power Cables	-	11,000 "
(c)	11KV Power Cables	-	9,000 "
(d)	600V Control Cables	-	239,000 "
	Total	-	462,000 metres

(iv) All cable glands and cable lugs, wherever necessary shall be supplied by the contractor, including cable jointing or termination kits for HV & LV cables.

(v) All local push button stations shall be supplied and installed by the contractor.

Annexure - I

PENDING JOBS - CONTRACT 162-150

WORK CATEGORY: PIPING (ABOVE 50 MM Ø) "ALL MILL AREAS"

Total Quantity		ACTIVITY DESCRIPTION					
Description	Meters	Prepare Spool Drawing (Meters)	Withdrawal from Store (Meters)	Fabrication (Meters)	Instal Pipe & Fittings (Meters)	Weld out (Meters)	Testing (Meters)
CS Up to 150	20,470	20,250	20,250	20,250	20,250	20,250	20,470
CS Above 150	8,982	8,732	8,732	8,732	8,732	8,732	8,982
SS Up to 150	14,629	14,629	14,629	14,629	14,629	14,629	14,629
SS Above 150	17,818	17,548	17,548	17,548	17,548	17,548	17,818
Power Group Piping	766	700	700	700	700	700	766

NOTE: All Pipes; Valves and Fittings of 50mm Ø and below will be supplied and installed by M & E Contractor. Estimated Quantity = 80,000 Meters.

CIVIL

STATUS REPORT BUILDING STATUS

RESIDENTIAL BUILDINGS

3 - Bedroom Duplex	-	183	Nos
Bachelor Quarters	-	27	"
Management 'A' Bungalow	-	5	"
Management 'B' Bungalow	-	26	"
Motel Courlets	-	7	"
Motel Central Facilities (Not yet completed, 70% completed)	-	1	No.

NON RESIDENTIAL BUILDINGS

Nursery & Primary School	-	66%	completed
Hospital complex			
(a) Administrative/Diagonistic and Emergency Blocks	-	94%	"
(b) Ward (Male, Maternity and Isolation	-	98%	"
(c) Cafeteria & Laundry	-	70%	"
(d) General Store	-	100%	"

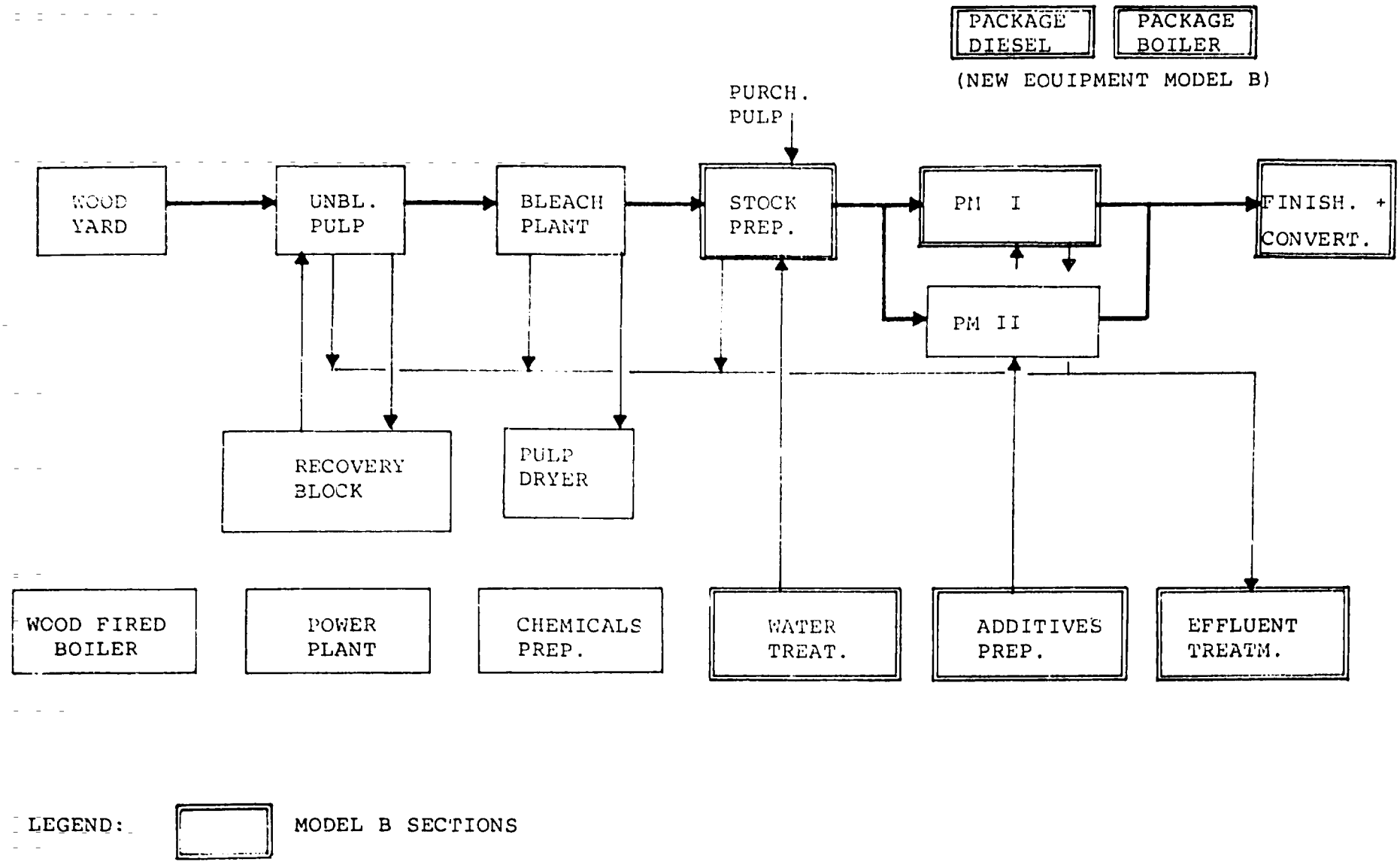
HILL SITE

1. Administrative Block
2. Training Building
3. Temporary Main Office

P-510d/03.6-2

Annex A - 3.3

Annex A-3.3 Mill block diagram



P-5108/03.6-2

Annex A - 4.1

1 INPUT DATA - FINANCIAL ANALYSIS
2 ==========
3 Ivapin Paper Mill - Phased Reactivation
4 ---------- I
5 91/01/20/RST I
6 FINANCIAL ANALYSIS IN 1000 US$ I 1
7 PROJECTION IN CONSTANT/REAL TERMS 0
8 MODEL'C'- ENERGY SOURCE: FUEL OIL 0
9
10 Exchange Rate March 1990: IUS$ = I 7.90 Naira
11 Avg Exchange Rate Old+Liabl.: IUS$ = 1.00 Naira
12 I
13 Key Project Implementation Data I
14 Year of Prod. Start SF Pulp I 1996
15 Year of Prod. Start P+W Paper I 1993
16 1st Year of Project Implementation I 1991
17 I
18 PRODUCTION PLANNING

19	I	Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
20 1. Bleached Short Fibre Pulp	I		1	2	3	4	5	6	7	8	9	10	11	12
21 Capacity (adt per shift)	I	122												
22 Capacity (bdt per shift)	I	110												
23 Capacity Utilization	I		0%	0%	0%	0%	0%	0%	50%	75%	90%	90%	90%	90%
24 Working Days per Year	I	340												
25 Number of Shifts	I	3												
26 Production (1000 bdt)	I		0.0	0.0	0.0	0.0	0.0	0.0	56.1	74.8	101.0	101.0	101.0	101.0
27 Export Sales (1000 adt)	I		0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	31.5	34.1	34.1	34.1
28 Water content (adt/bdt)	I	10%												
29														
30 Pulp and Pulpwood Requirements														
31 Bleached LF Pulp (adt)														
32 o Woodfree Paper: wf-1			0.0	0.0	0.0	11,424.0	16,184.0	16,184.0	12,947.2	16,184.0	16,184.0	16,184.0	16,184.0	16,184.0
33 o Woodfree Paper: wf-2			0.0	0.0	0.0	0.0	0.0	0.0	13,502.1	16,877.6	16,877.6	16,877.6	16,877.6	16,877.6
34 o Wood Containing Paper: wc			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35 Total BI LF Pulp Requirements			0.0	0.0	0.0	11,424.0	16,184.0	16,184.0	26,449.3	33,061.6	33,061.6	33,061.6	33,061.6	33,061.6
36 TMP Pulp (adt)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37 Bleached SF Pulp (adt)	I													
38 o Woodfree Paper: wf-1	I		0.0	0.0	0.0	26,724.0	37,859.0	37,859.0	30,287.2	37,859.0	37,859.0	37,859.0	37,859.0	37,859.0
39 o Woodfree Paper: wf-2	I		0.0	0.0	0.0	0.0	0.0	0.0	31,628.2	39,535.2	39,535.2	39,535.2	39,535.2	39,535.2
40 Total BI SF Pulp Requirements	I		0.0	0.0	0.0	26,724.0	37,859.0	37,859.0	61,915.4	77,394.2	77,394.2	77,394.2	77,394.2	77,394.2
41	I		0.0	0.0	0.0	0.0	0.0	0.0	618.0	16,105.8	34,805.8	34,805.8	34,805.8	34,805.8
42 Gmelina Pulpwood						0.0	0.0	0.0	5,610.0	2,805.0	1,683.0	0.0	0.0	0.0
43 o 1000 m3 sub			0.0	0.0	0.0	0.0	0.0	0.0	329.7	494.5	593.4	593.4	593.4	593.4
44 o 1000 mt			0.0	0.0	0.0	0.0	0.0	0.0	115.4	173.1	207.7	207.7	207.7	207.7
45 o Average Specific Weight (t/m3 sub)		0.350							5,192.0	0.0	0.0	0.0	0.0	0.0
46														
47		Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
48 2. Printing and Writing Paper	I													
49 Capacity(mt per shift,paper m/c)	I	67												
50 Number of Paper Making Machinery	I		1	1	1	1	1	1	2	2	2	2	2	2
51 Capacity Utilization	I		0%	0%	0%	60%	85%	85%	85%	85%	85%	85%	85%	85%
52 Working Days per Year	I	340												
53 Number of Shifts	I	3												
54 Production (1000 mt)	I		0.0	0.0	0.0	40.8	57.8	57.8	92.5	115.6	115.6	115.6	115.6	115.6
55 Sales (1000 mt)														
56 Woodfree Paper: wf-1	I		0.0	0.0	0.0	36.3	55.9	57.8	44.3	56.5	57.8	57.8	57.8	57.8
57 Woodfree Paper: wf-2	I		0.0	0.0	0.0	0.0	0.0	0.0	44.3	56.5	57.8	57.8	57.8	57.8
58 Wood Containing Paper: wc			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59														

60 SALES / MARKETING DATA
61
62 1. Product Mix I Model'B' Model'C'
63 o Woodfree Paper: wf-1 I 100% 50%
64 o Woodfree Paper: wf-2 I 50%
65 o Wood containing Paper: wc I 0%
66 Share of Sales in Reels I 30% 30%
67
68 2. Product Prices (Ex-factory) I
69 Export Market
70 o Bl Short Fiber Pulp US$/adt 450
71 Domestic Market I wf-1 wf-2 wc
72 o Paper in Reels US$/mt I 1200 1200 1100
73 o Paper in Sheets US$/mt I 1250 1250 1150
74
75
76 Working Capital Requirements
77 Pulp Wood Stock (month) I 1
78 Other Local Material Stock(month) I 1
79 Imported Material Stock (month) I 3
80 Work in Process (days) I 10
81 Finished Goods Stock (month) I 1
82 Trade Debtors (day) I 30
83 Trade Creditors (days) I 30
84 Min. Cash Requirements (days) 20
85

P-5108/03.6-2

Annex A - 4.2

P-5108/03.6-2 Annex A - 4.2 p.1

1. Equipment Cost Estimate

	Model B		Model C	
	1000 US$	1000 N	1000 US$	1000 N
Wood preparation	-	-	5'300	630
Digester, Brown Stock	-	-	530	-
Bleach plant	-	-	8'560	-
Pulp drying	-	-	260	-
Evaporators	-	-	290	-
Recovery Boiler	-	-	2'380	500
Recausticizing	-	-	280	-
Lime Kiln	-	-	260	250
Chem. Preparation	-	-	12'000	650
Stock Preparation	160	125	410	200
Paper Mill	7'300	250	10'200	500
Finishing, Converting	2'500	250	3'000	250
Power and Aux.Boilers	420	250	400	250
Turbo Generators	-	-	400	-
Power Group Aux.	420	250	570	-
Water supply	70	75	270	100
Effluent treatment	25	200	1'600	250
Maintenance serv.	2'080	250	6'440	1'000
Communications	1'040	125	4'290	500
Administration Serv.	230	375	570	1'000
Fire Protection, safety	230	65	570	130
Lab. and Techn.Control	355	125	890	250
Spare Parts&Store items	2'810	500	10'750	1'000
Pumps and Agitators	115	-	450	-
Piping	1'540	500	8'950	1'500
Electrical	1'460	500	8'870	1'500
Instrumentation	1'540	250	5'820	500
Tile Lining	-	-	400	-
Gratings,Covers,Guards	750	400	2'580	1'000
Mobile Equipment	1'770	-	5'600	2'000
Freight, Insurance	2'400	400	10'000	5'000
Total	27'215	4'890	113'120	18'960

Notes: Major cost components have been estimated with vendors input obtained in April/May 90. Other cost elements were calculated from P&W estimates, after critical review of such data and corresponding adaptations to the 1990 cost level.

2. Civil Works Cost Estimate Mill (1000 N 1990 est.)

	Model B	Model C
Earthwork	40	90
Reinforced concrete incl. steel	900	2'500
Tiling	300	450
Structural & ancillary steel	10'800	15'300
Siding & Masonry	850	1'400
Roofing	700	1'850
Flooring	450	750
Internal finishing	750	1'100
Apertures	700	1'000
Plumbing	250	560
Lighting & LV services	200	400
Painting & decoration	200	350
Structure & civil general	2'500	13'700
	18'600	39'500
Contractor's preliminaries 25%	4'600	10'000
Furniture	800	1'320
Contingencies 5%	1'000	2'000
Civil works mill (total)	25'000	52'820

3. Civil Works Cost Estimate Townsite (1000 N 1990 est.)

	Model B	Model C
Houses, bungalows, etc.	33'920[1)]	38'520[2)]
Motel, chalet blocks and central facilities	-	2'037
Nursery and primary school	-	1'845
Hospital complex	-	3'500
Emergency ward	600	(-)
Water supply system	105	122
Roads and drainage	4'000	8'750
Electrification	875	95o
	39'500	55'724

[1)] Model B: All houses and bachelor quarters, 50% of bungalows incl. ancillaries and services

[2)] Model C: As for B, but including all bungalows etc.

4. Erection Cost Estimate

	1987		1990/91	
	$ x 1000	N x 1000	$ x 1000	N x 1000
Management & supervision	6'000	1'300	6'720	2'600
Erectors & commissioning eng.	5'700	200	6'820	400
Tradesmen & specialists	2'800	6'800	3'400	13'600
Indirect & other labour		5'200		10'400
Subtotal labour			16'940	27'000
Camp operation		2'800		7'000
Townsite costs		5'200		13'000
Catering		5'600		14'000
Medical & social services	180	500	220	1'250
Fares & travel expenses	1'020	1'100	2'040	2'750
Subtotal Personnel services			2'260	38'000
Erection equipment	4'920	2'100	5'510	6'300
Erection materials	540	2'200	610	6'600
Erection consumables	360	2'100	400	6'300
Temporary buildings	180	600	200	1'500
Duties & levies		3'400		
Freight clearance		600		1'500
Subtotal equipment & materials			6'720	22'200
Lagos office expenses	170	2'000	190	5'000
Communications	260	900	290	2'250
Site office expenses	90	700	100	1'750
Insurance	280	1'100	320	2'750
Mobilisation & demobilisation	2'700	3'000	3'030	7'500
Overheads	2'800	4'600	3'140	11'500
Subtotal offices & overheads			7'070	30'750
Total			32'990	117'950

5. Total Investment cost

		Model B		Model C	
		$ x 1000	N x 1000	$ x 1000	N x 1000
1	Project management, engineering	370	300	4'160	1'000
2	Equipment, materials	27'215	4'890	113'120	18'960
3	Equipment inspection	(in 2)		740	450
4	Equipment refurbishment	(in 2)		7'500	32'500
5	Site management	(in 1)		9'410	18'800
6	Training	(in 1)		500	2'400
7	Technical assistance	(in 1)		11'700	5'600
8	Civil works millsite		25'000		52'820
9	Erection services	11'200	35'000	32'990	117'950
10	Contingency			9'000	12'500
11	Civil work - townsite		39'500		55'730
12	Forestry	p.m.	p.m.		
Total		38'785	104'690	189'120	318'710

P-5108/03.6-2

Annex A - 4.3. -1

Material Requirements and Costs

		Unit Costs	Mat.Requirements		Material Costs	
1.	Production of Bl Short Fibre Pulp					
		[Naira/m3sub	m3sub/bdt pulp		Naira/bdt	US$/bdt
	Gmelina Pulp Wood	188	8.778		1650	208.9
	Chemicals	Naira/t	kg/bdt pulp			
	o Sodiumcarbonate (Na2CO3)	3,600	0.5		2	0.2
	o Caustic Soda (NaOH) 100%	6,000	0.0		0	0.0
	o Sodium Chloride (NaCl) 100%	1,100	42.0		46	5.8
	o Sulphuric Acid (H2SO4) 100%	4,550	2.0		9	1.2
	o Sulphur (S)	6,500	5.0		33	4.1
	o Lime Stone (CaCO3)	780	60.0		47	5.9
	o Salt Cake (Na2SO4)	1,950	25.0		49	6.2
	o Hydrogenperoxid(H2O2)100% Nair	11	0.0		0	0.0
	o Liquid Chlor. Nair	35	0.0		0	0.0
	o Chemicals for Effluent Treatm.				198	25.0
	Material Costs Bleached Short Fibre				2,033	257.3

			Model 'B'				Model 'C'			
2.	Production of Paper		Mat.Requirements (ad kg pulp/ft paper)		Material Costs (US$/ft paper)		Mat.Requirements (ad kg pulp/ft paper)		Material Costs (US$/ft paper)	
	Pulp	US$/adt pulp	wf-1	wc	wf-1	wc	wf-1	wf-2	wf-1	wf-2
	o Bl LF Chemical Pulp (ad)	910	280	375	254.8	341.3	280	292	254.8	265.7
	o TMP Pulp (ad)	685	0	590	0.0	404.2				
	o Bl SF Chemical Pulp (ad)	800	655	0	524.0	0.0	655	684	168.5	176.0
	Chemicals and Additives	US$/t mat.	(kg/ft paper)				(kg/ft paper)			
	o China Clay	616	85	89	52.4	54.8	85	89	52.4	54.8
	o Size	1455	7	7	10.2	10.2	7	7	10.2	10.2
	o Alum	500	12	12	6.0	6.0	12	12	6.0	6.0
	o Starch	886	45	0	39.9	0.0	45	0	39.9	0.0
	Wrapping Material				9.0	9.0			9.0	9.0
	Material Costs P+W Paper		1084.00	1073.00	896.2	825.4	1084.00	1084.00	540.8	521.7

P-5108/03.6-2

Annex A - 4.3 - 2

Table : Projected Payroll of Iwopin Paper Mill - Model 'B'

Department	Position/Job Title	Projected Employment	Avg. Salary (Naira/MO)	Social Benefit (% of Salary)	Social Benefit (Naira/MO)	Total Payroll (Naira/Month)	Total Payroll (1000 Naira p.a.)
General Manager	Manager	1	8,000	50%	4,000	12,000	144.0
	Secretary	2	800	25%	200	2,000	24.0
						0	0.0
Quality Control	Unit Head	3	3,500	50%	1,750	15,750	189.0
Unit	Quality Inspector	9	800	25%	200	9,000	108.0
	Helper/Checker	12	300	25%	75	4,500	54.0
						0	0.0
	Subtotal	27				43,250	519.0
Administration	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	2	4,000	50%	2,000	12,000	144.0
	Section Head	6	3,500	40%	1,400	29,400	352.8
	Secretary/Typist	2	800	25%	200	2,000	24.0
	Personnel	18	1000	25%	250	22,500	270.0
	Medical	10	1000	25%	250	12,500	150.0
	Transport	25	800	25%	200	25,000	300.0
	Fire	15	400	25%	100	7,500	90.0
	Security	35	400	25%	100	17,500	210.0
	Subtotal	114				135,900	1,630.8
Finance	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	2	4,000	50%	2,000	12,000	144.0
	Section Head	6	3,500	40%	1,400	29,400	352.8
	Secretary/Typist	1	800	25%	200	1,000	12.0
	Accountant	12	2,000	50%	1,000	36,000	432.0
	Clerk	10	1,000	25%	250	12,500	150.0
	Subtotal	32				98,400	1,186.8
Commercial	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	2	4,000	50%	2,000	12,000	144.0
	Section Head	5	3,500	40%	1,400	24,500	294.0
	Secretary/Typist	1	800	25%	200	1,000	12.0
	Storekeeper	15	1,000	25%	250	18,750	225.0
	Clerk	10	600	25%	150	7,500	90.0
	Helper/Unskilled/Casual	8	300	0%	0	2,400	28.8
	Subtotal	42				73,650	883.8
Maintenance	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	2	4,000	50%	2,000	12,000	144.0
	Section Head/Foreman	8	3,500	40%	1,400	39,200	470.4
	Secretary/Typist/Clerk	1	800	25%	200	1,000	12.0
	Technician	6	800	25%	200	6,000	72.0
	Mechanic, Electrician	30	800	25%	200	30,000	360.0
	Civil Works	9	800	25%	200	9,000	108.0
	Engineering, Workshop	20	800	25%	200	20,000	240.0
	Utility	9	900	40%	360	11,340	136.1
	Drawing Office	5	800	25%	200	5,000	60.0
	Helper/Unskilled/Casual	35	300	0%	0	10,500	126.0
	Subtotal	126				151,540	1,818.5
Production	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	2	4,000	50%	2,000	12,000	144.0
	Section Head/Foreman	5	3,500	40%	1,400	24,500	294.0
	Secretary/Typist/Clerk	4	800	25%	200	4,000	48.0
	Operator/Warehouse	146	800	25%	200	146,000	1,752.0
	Helper/Unskilled/Casual	79	300	0%	0	23,700	284.4
	Subtotal	237				217,700	2,612.4
Total Paper Mill		578				720,440	8,645.3

Social Benefits = housing and tran

Table : Projected Payroll of Iwopin Paper Mill - Model 'C'

Department	Position/Job Title	Projected Employment	Avg. Salary (Naira/MO	Social Benefit % of Salary	Social Benefit (Naira/MO	Total Payroll Naira/Month	Total Payroll '000Naira p.a.
General Manager	Manager	1	8,000	50%	4,000	12,000	144.0
	Secretary	2	800	25%	200	2,000	24.0
						0	0.0
Quality Control	Unit Head	3	3,500	50%	1,750	15,750	189.0
Unit	Quality Inspector	12	800	25%	200	12,000	144.0
	Helper/Checker	12	300	25%	75	4,500	54.0
						0	0.0
	Subtotal	30				46,250	555.0
Administration	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	2	4,000	50%	2,000	12,000	144.0
	Section Head	6	3,500	40%	1,400	29,400	352.8
	Secretary/Typist	2	800	25%	200	2,000	24.0
	Personnel	18	1000	25%	250	22,500	270.0
	Medical	10	1000	25%	250	12,500	150.0
	Transport	25	800	25%	200	25,000	300.0
	Fire	15	400	25%	100	7,500	90.0
	Security	35	400	25%	100	17,500	210.0
	Subtotal	114				135,900	1,630.8
Finance	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	2	4,000	50%	2,000	12,000	144.0
	Section Head	6	3,500	40%	1,400	29,400	352.8
	Secretary/Typist	1	800	25%	200	1,000	12.0
	Accountant	12	2,000	50%	1,000	36,000	432.0
	Clerk	10	1,000	25%	250	12,500	150.0
	Subtotal	32				98,400	1,180.8
Commercial	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	2	4,000	50%	2,000	12,000	144.0
	Section Head	5	3,500	40%	1,400	24,500	294.0
	Secretary/Typist	1	800	25%	200	1,000	12.0
	Storekeeper	15	1,000	25%	250	18,750	225.0
	Clerk	10	600	25%	150	7,500	90.0
	Helper/Unskilled/Casual	8	300	0%	0	2,400	28.8
	Subtotal	42				73,650	883.8
Maintenance	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	3	4,000	50%	2,000	18,000	216.0
	Section Head/Foreman	16	3,500	40%	1,400	78,400	940.8
	Secretary/Typist/Clerk	1	800	25%	200	1,000	12.0
	Technician	8	800	25%	200	8,000	96.0
	Mechanic, Electrician	47	800	25%	200	47,000	564.0
	Civil Works	9	800	25%	200	9,000	108.0
	Engineering, Workshop	20	800	25%	200	20,000	240.0
	Utility	9	900	40%	360	11,340	136.1
	Draving Office	5	800	25%	200	5,000	60.0
	Helper/Unskilled/Casual	62	300	0%	0	18,600	223.2
	Subtotal	181				223,840	2,686.1
Production	Department Head	1	5,000	50%	2,500	7,500	90.0
	Division Head	4	4,000	50%	2,000	24,000	288.0
	Section Head/Foreman	9	3,500	40%	1,400	44,100	529.2
	Secretary/Typist/Clerk	4	800	25%	200	4,000	48.0
	Operator/Warehouse	291	800	25%	300	291,000	3,492.0
	Helper/Unskilled/Casual	142	300	0%	0	42,600	511.2
	Subtotal	451				413,200	4,958.4
Total Paper Mill		850				991,240	11,894.9

Social Benefits = housing and transport

P-5108/03.6-2

Annex A - 4.3.2 -1

Distribution Expenses (1000 US$)	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Salaries and Wages	0.0	0	0	0	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112
Sales Promotion(incl.Publicatio	0.5	1	1	1	67	104	107	164	215	235	237	237	237	237	237	237	237	237	237
Transport and Per Diems	0.0	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Depreciation	0.0	0	0	0	821	845	845	1,196	1,391	1,231	1,231	1,085	864	864	864	864	864	864	864
Miscellaneous	2.2	2	2	11	64	75	76	93	108	115	115	115	115	115	115	115	115	115	115
Total Distribution	2.7	3	3	46	1,099	1,171	1,176	1,601	1,860	1,727	1,730	1,584	1,363	1,363	1,363	1,363	1,363	1,363	1,363
Administration Expenses (1000 US$)																			
Salaries and Wages	2.3	2	2	2	422	422	422	426	426	426	426	426	426	426	426	426	426	426	426
Leases - Rent	10.1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Postage and Telecommunication	10.3	10	10	10	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Printing and Stationary	5.3	5	5	5	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Light, Power, Water	0.0	5	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Repair and Maint.(Admin.Buildin	11.0	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Vehicle Running	12.9	13	13	13	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Travel Expenses (Allowance)	10.5	11	11	11	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Insurance	0.0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Staff Training	0.0	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Bank Charges	4.3	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Depreciation	0.0	0	0	0	1,642	1,691	1,691	2,392	2,781	2,461	2,461	2,169	1,727	1,727	1,727	1,727	1,727	1,727	1,727
Miscellaneous	7.7	8	8	8	121	121	121	122	122	122	122	122	122	122	122	122	122	122	122
Total Administration	74.5	9	9	9	2,370	2,419	2,419	3,126	3,515	3,195	3,195	2,903	2,461	2,461	2,461	2,461	2,461	2,461	2,461

P-5108/03.6-2

Annex A - 4.3.3. - 1

266

267 ANALYSIS OF CONTRIBUTION CAPACITY (US $/Day) US $/adt

268		Model 'B'		Model 'C'			
269 Paper Quality		uf-1	uc	uf-1	uf-2	Bl SF Pulp	Bl SF Pulp
271 1. Revenues							
272 o Bl SF Pulp (Export)						165,000.0	1,350.0
273 o Paper in Reels		72,000.0	66,000.0	72,000.0	72,000.0		
274 o Paper in Sheets		175,000.0	161,000.0	175,000.0	175,000.0		
275 Average Revenue per Shift		247,000.0	227,000.0	247,000.0	247,000.0	165,000.0	1,350.0
277 2. Direct Costs							
278 o Imported Bl LF Pulp		50,960.0	68,250.0	50,960.0	53,144.0	0.0	0.0
279 o Imported TMP Pulp		0.0	80,830.0	0.0	0.0	0.0	0.0
280 o Imported Bl SF Pulp		104,800.0	0.0	0 0	0.0	0.0	0.0
281 o Gaelina Pulpwood		0.0	0.0	24,628.0	25,718.4	68,933.3	564.0
282 o Chemicals + Additives		23,683.0	16,001.8	29,193.7	21,965.3	15,984.1	130.8
283 o El.Energy and Steam		4,337.7	4,337.7	25,787.7	26,272.4	47,572.8	389.2
285 Total Costs		133,580.7	169,419.5	130,569.4	127,100.2	132,490.2	1,084.0
287 Financial Contribution Capacity (FCC)		53,619.3	57,580.5	116,430.6	119,899.8	32,509.8	266.0
288							

P-5108/03.6-2

Annex A - 4.3.3. - 2

615 Table : CASH FLOW FOR FIRR BEFORE TAXATION IN 1000 US$ Model "B" only

616

617 Ivoqin Paper Mill-Phased Re-activation: Erection Erection--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'--Model'B'

618

619 Item		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
620																			
621 Cash Inflow																			
622																			
623	Sales Revenue	0	0	0	44,739	69,050	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383
624	Residual Value																		0
625	Working Capital																		21,026
626																			
627 Cash Inflow		0	0	0	44,739	69,050	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	92,409
628																			
629 Cash Outflow																			
630																			
631 Investment																			
632	Preinvestment Expenses	0	214	217	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
633	Fixed Investments	0	38,233	19,071	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
634	Change in Working Capital	0	0	8,768	4,736	867	194	0	(0)	0	0	0	0	0	0	0	0	0	0
635 Subtotal		0	38,447	28,057	4,786	867	194	0	(0)	0	0	0	0	0	0	0	0	0	0
636 Operations																			
637	Materials	0	0	0	36,566	51,801	51,801	51,801	51,301	51,801	51,801	51,801	51,801	51,801	51,801	51,801	51,801	51,801	51,801
638	Salaries,Wages,Uniforms,Med.Exp.	157	157	157	702	702	702	702	702	702	702	702	702	702	702	702	702	702	702
639	Repair & Maintenance	68	68	68	1,721	2,401	2,401	2,401	2,401	2,401	2,401	2,401	2,401	2,401	2,401	2,401	2,401	2,401	2,401
640	Other Operational Cost	264	264	264	2,943	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638
641 Subtotal		489	489	489	41,931	58,542	58,542	58,542	58,542	58,542	58,542	58,542	58,542	58,542	58,542	58,542	58,542	58,542	58,542
642 Overheads																			
643	Administration	9	9	9	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728
644	Selling & Distribution	3	3	46	278	326	330	330	330	330	330	330	330	330	330	330	330	330	330
645	Other Overheads	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
646 Subtotal		34	34	77	1,029	1,075	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
647 Net Assets Existing Plant		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
648																			
649 Cash Outflow		523	38,969	28,623	47,746	60,484	59,816	59,622	59,622	59,622	59,622	59,622	59,622	59,622	59,622	59,622	59,622	59,622	59,622
650																			
651 NET CASH FLOW		(523)	(38,969)	(28,623)	(2,956)	8,566	11,567	11,761	11,761	11,761	11,761	11,761	11,761	11,761	11,761	11,761	11,761	11,761	32,787
652																			
653 FIRR		11.1%																	
654																			
655 NET PRESENT VALUE AT 10 %		4,659.0																	

Table : CASH FLOW FOR FIRR BEFORE TAXATION IN 1000 US$ Model "B" and "C' consecutive

Tuopin Paper Mill-Phased Re-activation:

Item		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
			Erection	Erection	--Model'B'--	--Model'B'--	--Model'B'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'--	--Model'C'
Cash Inflow																			
	Sales Revenue	0	0	0	44,789	69,050	71,383	109,454	143,098	156,935	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097
	Residual Value																		37,280
	Working Capital																		33,676
Cash Inflow		0	0	0	44,789	69,050	71,383	109,454	143,098	156,935	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097	229,053
Cash Outflow																			
Investment																			
	Preinvestment Expenses	0	214	217	0	16,014	15,663	0	0	0	0	0	0	0	0	0	0	0	0
	Fixed Investments	0	38,233	19,071	0	114,910	71,491	0	0	0	0	0	0	0	0	0	0	0	0
	Change in Working Capital	0	0	8,768	4,786	883	(1,856)	5,025	2,465	828	98	0	(0)	0	0	0	0	0	0
Subtotal		0	38,447	28,057	4,786	131,808	85,299	5,025	2,465	828	98	0	(0)	0	0	0	0	0	0
Operations																			
	Materials	0	0	0	36,566	51,801	51,801	51,787	63,151	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482
	Salaries,Wages,Uniforms,Med.Exp.	157	157	157	702	702	702	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167
	Repair & Maintenance	68	68	68	1,721	2,401	2,401	3,788	4,713	4,713	4,713	4,713	4,713	4,713	4,713	4,713	4,713	4,713	4,713
	Other Operational Cost	264	264	264	2,943	3,838	4,279	4,612	5,665	5,896	5,911	5,911	5,911	5,911	5,911	5,911	5,911	5,911	5,911
Subtotal		489	489	489	41,931	58,742	59,183	61,355	74,696	79,258	79,273	79,273	79,273	79,273	79,273	79,273	79,273	79,273	79,273
Overheads																			
	Administration	9	9	9	728	728	728	734	734	734	734	734	734	734	734	734	734	734	734
	Selling & Distribution	3	3	46	278	326	330	404	470	497	499	499	499	499	499	499	499	499	499
	Other Overheads	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Subtotal		34	34	77	1,028	1,075	1,080	1,160	1,225	1,252	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255
Net Assets Existing Plant		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Outflow		523	38,969	28,623	47,746	191,625	145,562	67,539	78,187	81,338	80,626	80,528	80,528	80,528	80,528	80,528	80,528	80,528	80,528
NET CASH FLOW		(523)	(38,969)	(28,623)	(2,956)	(122,575)	(74,179)	41,916	64,911	75,597	77,471	77,569	77,569	77,569	77,569	77,569	77,569	77,569	148,525
FIRR	17.7%																		
NET PRESENT VALUE AT 10 %	111,341.7																		

Annex A-4.4-0

Average Exchange Rate

Year	Average Exchange Rate	
	Naira	US$
1977	1	1.5
1978	1	1.6
1979	1	1.67
1980	1	1.86
1981	1	1.49
1982	1	1.5
1983	1	1.15
1984	1	1.13
1985	1	1.136
1986 up to 9/86 since 10/86	1 4.4	1.1 1
1987	5.5	1
1988	6.3	1
1989	7.5	1
1990 (March)	7.9	1

P-5108/03.6-2

Annex A - 4.4

Table : PROJECTED PROFIT AND LOSS ACCOUNT (x 1000 US$)

Tembilahan Paper Mill-Phased Re-activation: Erection Erection--Model'B'--Model'B'--Model'B'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'

Item	Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sales Revenue																				
Domestic Market																				
Woodfree Paper: wf-1		0	0	0	0	44,789	69,050	71,383	54,727	69,797	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383
Woodfree Paper: wf-2		0	0	0	0	0	0	0	54,727	69,797	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383	71,383
Wood Containing Paper: wc		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal Domestic Market		0	0	0	0	44,789	69,050	71,383	109,454	139,593	142,766	142,766	142,766	142,766	142,766	142,766	142,766	142,766	142,766	142,766
Export Market																				
Bleached Short Fibre Pulp		0	0	0	0	0	0	0	0	3,504	14,169	15,331	15,331	15,331	15,331	15,331	15,331	15,331	15,331	15,331
Other Income		128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Sales Revenues		128	0	0	0	44,789	69,050	71,383	109,454	143,098	156,935	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097
Cost of Sales																				
Material Costs		0	0	0	0	36,566	51,801	51,801	51,787	65,151	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482
Salaries and Wages		122	122	122	122	561	561	561	968	968	968	968	968	968	968	968	968	968	968	968
Uniforms and Outfit		0	0	0	0	32	32	32	58	58	58	58	58	58	58	58	58	58	58	58
Medical Expenses		36	36	36	36	110	110	110	161	161	161	161	161	161	161	161	161	161	161	161
Diesel for Power Generation(Model'B')		0	0	0	0	694	700	700	0	0	0	0	0	0	0	0	0	0	0	0
Water		0	0	0	0	8	8	8	16	19	20	20	20	20	20	20	20	20	20	20
Repair and Maintenance																				
o Buildings and Civil Works		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
o Machinery and Equipment		28	28	28	28	1,632	2,312	2,312	3,699	4,624	4,624	4,624	4,624	4,624	4,624	4,624	4,624	4,624	4,624	4,624
o Vehicles		17	17	17	17	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
o Barges		0	15	15	15	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Fuel Oil		0	0	0	0	391	554	554	1,528	2,120	2,457	2,472	2,472	2,472	2,472	2,472	2,472	2,472	2,472	2,472
Insurance		174	174	174	174	1,216	1,612	1,844	1,552	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852
Transportation of Workers		0	0	0	0	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Depreciation		1	0	0	0	30,373	31,282	31,282	44,261	51,449	45,529	45,529	40,127	31,954	31,954	31,954	31,954	31,954	31,954	31,954
Miscellaneous		89	89	89	89	822	1,152	1,160	1,203	1,461	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554
Production Costs		474	489	489	489	72,304	90,024	90,465	105,615	129,965	126,787	126,803	119,400	111,227	111,227	111,227	111,227	111,227	111,227	111,227
Stocks																				
Opening Work in Process		0	0	0	0	0	1,512	1,970	1,976	3,335	4,100	4,158	4,189	4,038	3,811	3,811	3,811	3,811	3,811	3,811
Closing Work in Process		0	0	0	0	1,512	1,970	1,976	3,335	4,100	4,188	4,189	4,038	3,811	3,811	3,811	3,811	3,811	3,811	3,811
Opening Finished Goods		0	0	0	0	0	6,025	7,502	7,539	14,690	17,533	17,340	17,342	16,442	15,080	15,080	15,080	15,080	15,080	15,080
Closing Finished Goods		0	0	0	0	6,025	7,502	7,539	14,690	17,533	17,340	17,342	16,442	15,080	15,080	15,080	15,080	15,080	15,080	15,080
Subtotal Stocks		0	0	0	0	7,537	1,934	43	8,310	3,808	(105)	3	(1,050)	(1,589)	0	0	0	0	0	0
Total Costs of Sales		474	489	489	489	64,767	88,090	90,422	97,305	122,157	126,892	126,800	120,451	112,816	111,227	111,227	111,227	111,227	111,227	111,227
GROSS SURPLUS		(346)	(489)	(489)	(489)	(19,977)	(19,039)	(19,039)	12,149	20,941	30,043	31,297	37,646	45,280	46,870	46,870	46,870	46,870	46,870	46,870
Overhead Costs																				
General Administration & Selling																				
Administration		9	9	9	9	2,370	2,619	2,619	3,126	3,515	3,195	3,195	2,903	2,661	2,661	2,661	2,661	2,661	2,661	2,661
Selling & Distribution		0	3	3	46	1,099	1,171	1,176	1,601	1,860	1,727	1,730	1,584	1,363	1,363	1,363	1,363	1,363	1,363	1,363
Audit Fees		21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
I.T.F.Expenses		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Subtotal		32	34	34	77	3,491	3,812	3,818	4,748	5,397	4,944	4,948	4,508	3,845	3,845	3,845	3,845	3,845	3,845	3,845
Financial Charges																				
Interest on Bank Overdraft		0	43	1,150	2,725	6,154	15,019	20,550	21,557	20,837	16,004	3,340	0	0	0	0	0	0	0	0
Interest on Old Local Loan		750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest on New Loan		0	0	5,027	10,053	10,053	10,841	10,628	26,315	26,205	25,250	24,317	23,046	21,547	19,701	17,650	14,700	11,535	10,060	8,551
Subtotal Financial Charges		750	43	6,177	12,778	16,210	33,860	38,978	48,872	47,043	39,253	27,657	23,046	21,547	19,701	17,650	14,700	11,535	10,060	8,551
Total Overheads		781	77	6,211	12,855	19,700	37,272	42,595	53,620	52,439	44,297	32,603	27,554	25,393	23,546	21,495	18,546	15,380	13,906	12,396
NET SURPLUS BEFORE TAX (LOSS)		(1,128)	(566)	(6,699)	(13,344)	(39,678)	(56,312)	(61,634)	(41,471)	(31,479)	(13,254)	694	10,092	19,888	23,324	25,375	28,324	31,489	32,964	34,473
Provision for Tax		0	0	0	0	0	0	0	0	0	0	312	4,553	8,950	10,496	11,509	12,746	14,260	14,843	15,513
NET SURPLUS AFTER TAX (LOSS)		(1,128)	(566)	(6,699)	(13,344)	(39,678)	(56,312)	(61,634)	(41,471)	(31,479)	(13,254)	382	5,540	10,938	12,828	14,066	15,578	17,229	18,121	18,960

478 Table : CASH FLOW FOR FINANCIAL PLANNING IN 1000 US$

479 ==========

480 Rumpin Paper Mill-Phased Re-activation: Erection Erection--Model'B'--Model'B'--Model'B'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'

481 ----------|---------- ----------

482 Item	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
484 Cash Inflow																		
485 Free Equity and Loan																		
486 State Capital	0	0	37,937	0	0	116,808	0	0	0	0	0	0	0	0	0	0	0	0
487 New Loan	0	37,937	0	0	116,758	0	0	0	0	0	0	0	0	0	0	0	0	0
488 Subtotal	0	37,937	37,937	0	116,758	116,808	0	0	0	0	0	0	0	0	0	0	0	0
489 From Operations																		
490 Sales Revenues Current Prod.	0	0	0	44,789	69,050	71,383	109,454	143,098	156,935	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097
491 Other Income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
492 Subtotal	0	0	0	44,789	69,050	71,383	109,454	143,098	156,935	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097
493 ----------|---------- ----------																		
494 Total Cash Inflow	0	37,937	37,937	44,789	185,808	188,191	109,454	143,098	156,935	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097
495 ----------|---------- ----------																		
496 Cash Outflow																		
497 ----------|----------																		
498 Investment																		
499 Pre-operational Expenses	0	214	217	0	16,014	15,663	0	0	0	0	0	0	0	0	0	0	0	0
500 Fixed Investment	0	38,233	19,071	0	114,910	71,691	0	0	0	0	0	0	0	0	0	0	0	0
501 Working Capital Built-up	0	0	8,768	4,736	883	(1,856)	5,025	2,465	828	98	0	(0)	0	0	0	0	0	0
502 Subtotal	0	38,447	28,057	4,736	131,808	85,299	5,025	2,465	828	98	0	(0)	0	0	0	0	0	0
503 Operations																		
504 Materials	0	0	0	36,566	51,801	51,801	51,737	63,151	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482	67,482
505 Salaries and Wages (incl.uniforms)	122	122	122	593	593	593	1,006	1,006	1,006	1,006	1,006	1,006	1,006	1,006	1,006	1,006	1,006	1,006
506 Medical Expenses	36	36	36	110	110	110	161	161	161	161	161	161	161	161	161	161	161	161
507 Repair and Maintenance	68	68	68	1,721	2,401	2,401	3,788	4,713	4,713	4,713	4,713	4,713	4,713	4,713	4,713	4,713	4,713	4,713
508 Other Operational Costs	264	264	264	2,963	3,838	4,279	4,612	5,665	5,896	5,911	5,911	5,911	5,911	5,911	5,911	5,911	5,911	5,911
509 Subtotal	489	489	489	41,951	58,742	59,183	61,355	74,696	79,258	79,273	79,273	79,273	79,273	79,273	79,273	79,273	79,273	79,273
510 Overheads (excl. debt service)																		
511 Administration	9	9	9	725	728	728	734	734	734	734	734	734	734	734	734	734	734	734
512 Selling & Distribution	3	3	6	278	326	330	404	470	497	499	499	499	499	499	499	499	499	499
513 Other Overheads	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
514 Subtotal	34	34	77	1,028	1,075	1,080	1,160	1,225	1,252	1,...5	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255
515 ----------|----------																		
516 Cash Outflow (excl.debt service)	523	38,969	28,623	47,716	191,625	145,562	67,539	78,187	81,338	80,626	80,528	80,528	80,528	80,528	80,...28	80,528	80,528	80,528
517 ----------|---------- ----------																		
518 Net Cash Flow	(523)	(1,032)	9,314	(2,956)	(5,818)	42,629	41,916	64,911	75,597	77,471	77,569	77,569	77,569	77,569	77,569	77,569	77,569	77,569
519 Cash Flow from Operations	(523)	(523)	(9,334)	12,956)	8,369	12,976	41,916	64,911	75,597	77,471	77,569	77,569	77,569	77,569	77,569	77,569	77,569	77,569
520 ----------|---------- ----------																		
521 Debt Service																		
522 Interest on Bank O/D	43	1,150	2,725	6,156	15,019	20,550	21,557	20,837	16,004	5,340	0	0	0	0	0	0	0	0
523 Interest on Old Loan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
524 Interest on New Loan	0	5,027	10,053	10,053	10,041	10,428	26,915	26,295	25,350	24,317	23,066	21,567	19,701	17,450	16,700	11,335	10,060	8,551
525 Repayment of Old Loan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
526 Repayment of New Loan	0	0	0	637	855	1,019	3,743	4,652	5,508	6,341	7,592	9,110	10,957	13,208	15,957	8,633	9,927	11,617
527 Subtotal	43	6,177	12,778	16,846	34,666	39,997	52,214	51,695	44,861	33,997	30,657	30,657	30,657	30,657	30,657	19,968	19,968	19,968
528 ----------|---------- ----------																		
529 Net Cash Flow After Debt Service	(566)	(7,209)	(3,464)	(19,802)	(40,283)	2,632	(10,300)	13,216	30,936	43,473	46,911	46,911	46,911	46,911	46,911	57,601	57,601	57,601
530 ----------|---------- ----------																		
531 Payment of Government Debts																		
532 ----------|----------																		
533 Taxes Payable	0	0	0	0	0	0	0	0	0	0	312	4,533	8,950	10,496	11,509	12,746	16,260	16,863
534 Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
535 Subtotal	0	0	0	0	0	0	0	0	0	0	312	4,533	8,950	10,496	11,509	12,746	16,260	16,863
536 ----------|---------- ----------																		
537 Net Cash Flow after Debt Payment	(566)	(7,209)	(3,464)	(19,802)	(40,283)	2,632	(10,300)	13,216	30,936	43,473	46,599	42,379	37,962	36,416	35,403	44,855	41,341	42,738
538 Accumulated Cash Flow	271 3 (295)	(7,504)	(10,968)	(30,770)	(71,053)	(68,421)	(78,721)	(65,505)	(34,569)	9,104	55,703	98,082	136,044	172,459	207,862	252,718	294,059	336,817
539 ==========|========== ==========																		
540																		
541 Cash Flow After Debt Services / Sales Rel	2 0%	0 0%	0.0%	-44.2%	-58.3%	3.7%	-9 6%	9 2%	19.7%	27.5%	29.7%	29.7%	29.7%	29.7%	29.7%	36.6%	36.6%	36.6%

Table : PROJECTED BALANCE SHEET IN USD

Sample Paper Mill-Phased Re-activation: Erection Erection--Model'B'--Model'B'--Model'B'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'--Model'C'

31st December	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Net Assets																			
Fixed Assets																			
Existing Fixed Assets	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	535,981	[illegible]981	535,981
New Assets	0	0	38,447	57,735	57,735	188,659	275,814	275,814	275,814	275,814	275,814	275,814	275,814	275,814	275,814	275,814	275,814	814	275,814
Accumulated Depreciation	4,505	4,505	4,505	4,505	37,740	71,158	104,976	152,825	208,446	257,667	306,888	350,268	384,813	419,357	453,902	488,446	522 [illegible]	[illegible],535	992,080
Subtotal	531,476	531,476	569,923	589,211	556,376	653,482	706,819	658,970	603,349	554,128	504,907	461,527	426,982	392,438	357,893	323,349	288,804	[illegible],260	219,715
Current Assets																			
Material in Stock	0	0	0	8,768	12,422	12,422	10,336	12,004	12,464	12,464	12,464	12,464	12,464	12,464	12,464	12,464	12,464	12,464	12,464
Work in Process	0	0	0	0	1,512	1,970	1,976	3,335	4,100	4,188	4,189	4,038	3,811	3,811	3,811	3,811	3,811	3,811	3,811
Finished Goods	0	0	0	0	6,025	7,502	7,539	14,490	17,533	17,340	17,342	16,442	15,080	15,080	15,080	15,080	15,080	15,080	15,080
	0																		
Spare Parts	0																		
Trade Debtors	0	0	0	0	3,732	5,756	5,949	9,121	11,925	13,078	13,175	13,175	13,175	13,175	13,175	13,175	13,175	13,175	13,175
Downpayments	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144	4,144
Prepayments	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
Other debtors	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192
Cash (Working Capital)	0	0	0	0	447	578	615	797	965	981	983	983	983	983	983	983	983	983	983
Bank	271	0	0	0	0	0	0	0	0	0	9,106	55,703	98,582	136,064	172,459	207,862	242,718	296,059	338,817
Subtotal	5,672	5,401	5,401	14,169	[illegible],540	33,627	31,816	45,148	52,368	53,452	62,656	108,206	148,996	186,957	223,373	258,776	303,631	346,972	389,731
Current Liabilities																			
Trade Creditors	0	0	0	0	187	264	264	1,506	1,892	2,203	2,203	2,203	2,203	2,203	2,203	2,203	2,203	2,203	2,203
Sundry Creditors & Accruals	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210	165,210
Foreign Supplies	0	0	0	0	2,861	4,052	4,052	3,009	3,371	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470	3,470
Bank Overdraft	0	295	7,504	10,968	30,770	71,053	68,421	78,721	65,305	34,369	0	0	0	0	0	0	0	0	0
Current Portion of Loan	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842	65,842
CBK Bank Loan	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400	67,400
Provision for Tax	0	0	0	0	0	0	0	0	0	0	312	4,533	8,950	10,696	11,509	12,746	14,260	14,863	15,513
Other Current Liabilities	231	231	231	231	231	231	231	231	231	231	231	231	231	231	231	231	231	231	231
Subtotal	278,683	278,978	286,187	289,651	312,500	354,053	351,421	361,720	349,250	318,676	284,619	288,839	293,256	296,802	295,815	297,052	298,567	299,169	299,819
Working Capital	(273,011)	(273,577)	(280,786)	(275,481)	(282,961)	(320,426)	(319,607)	(316,[illegible]72)	(296,882)	(265,223)	(221,961)	(180,633)	(144,260)	(107,845)	(72,442)	(38,276)	5,065	47,803	89,911
Total Net Assets	258,465	257,899	289,137	313,730	273,415	333,056	387,212	342,398	306,467	288,905	282,946	280,894	282,722	286,593	285,451	285,073	293,869	307,083	309,627
Financed By																			
Equity																			
State Capital	140,000	140,000	140,000	177,937	177,937	177,937	294,765	294,765	294,765	294,765	294,765	294,765	294,765	294,765	294,765	294,765	294,765	294,765	294,765
Less Calls-in-Arrears	23,190	23,190	23,190	23,190	23,190	23,190	23,190	23,190	23,190	23,190	23,190	23,190	23,190	23,190	23,190	[illegible],190	23,190	23,190	23,190
Accumulated Deficit	75,229	75,794	82,493	95,837	135,515	191,827	253,660	296,532	326,010	338,265	338,265	338,265	338,265	338,265	338,265	338,265	338,265	338,265	338,265
Reserves Accumulated from Past	0	0	0	0	0	0	0	0	0	0	0	382	5,922	16,[illegible]90	29,648	43,734	59,332	76,761	94,903
Reserves Current Year	0	0	0	0	0	0	0	0	0	0	382	5,540	10,958	12,828	14,086	15,578	17,429	18,141	18,960
Subtotal	41,582	41,016	34,317	58,910	19,232	(37,080)	18,095	(22,[illegible]63)	(54,455)	(66,710)	(66,328)	(60,788)	(69,850)	(37,021)	(22,955)	(7,377)	10,052	28,193	47,153
Long-Term Loan																			
Old Loan	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883	216,883
New Loan	0	0	37,937	37,937	37,300	153,252	152,234	148,491	144,029	138,732	132,391	124,799	115,644	104,752	91,524	75,567	66,936	57,007	45,590
Subtotal	216,883	216,883	254,820	254,820	254,183	370,136	369,117	365,374	360,912	355,615	349,274	341,682	332,571	321,635	308,407	292,450	283,819	273,890	262,473
Total Capital Employed	258,465	257,899	289,137	313,730	273,415	333,056	387,212	342,398	306,467	288,905	282,946	280,894	282,722	286,593	285,451	285,073	293,869	307,083	309,627
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

NOTE ALL EXISTING ASSETS AND LIABILITIES HAVE BEEN CONVERTED [illegible] BY USING AN AVERAGE EXCHANGE RATE OF 1 US $ = [illegible].00 KWACHA

P-5108/03.6-2

Annex A-4.5. - 1

942 BREAK-EVEN ANALYSIS IN 1000 US$

Item	Distrib. of Cost	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Variable Costs																		
Material	100%	0	0	0	36,566	51,801	51,801	51,787	63,151	67,682	67,682	67,682	67,682	67,682	67,682	67,682	67,682	67,682
Salaries, Wages, Uniforms, Med.Exp.	25%	39	39	39	176	176	176	292	292	292	292	292	292	292	292	292	292	292
Diesel for Power Generation(Model'B')	50%	0	0	0	247	350	350	0	0	0	0	0	0	0	0	0	0	0
Repair and Maintenance	45%	30	30	30	774	1,080	1,080	1,705	2,121	2,121	2,121	2,121	2,121	2,121	2,121	2,121	2,121	2,121
Fuel Oil	50%	0	0	0	196	277	277	764	1,060	1,228	1,236	1,236	1,236	1,236	1,236	1,236	1,236	1,236
Insurance	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation of Workers	20%	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Depreciation	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Administration	35%	3	3	3	255	255	255	257	257	257	257	257	257	257	257	257	257	257
Selling & Distribution	50%	1	1	23	139	163	165	202	235	248	250	250	250	250	250	250	250	250
Audit Fees	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I.T.F.Expenses	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellenous	50%	45	45	45	411	576	580	602	730	777	777	777	777	777	777	777	777	777
Total Variable Costs		119	119	141	38,766	54,680	54,687	55,611	67,848	72,408	72,416	72,416	72,416	72,416	72,416	72,416	72,416	72,416
Fixed Costs																		
Material	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salaries, Wages, Uniforms, Med.Exp.	75%	118	118	118	527	527	527	875	875	875	875	875	875	875	875	875	875	875
Diesel for Power Generation	50%	0	0	0	247	350	350	0	0	0	0	0	0	0	0	0	0	0
Repair and Maintenance	55%	37	37	37	946	1,320	1,320	2,083	2,592	2,592	2,592	2,592	2,592	2,592	2,592	2,592	2,592	2,592
Fuel Oil for Steam Generation	50%	0	0	0	196	277	277	764	1,060	1,228	1,236	1,236	1,236	1,236	1,236	1,236	1,236	1,236
Insurance	100%	176	176	176	1,216	1,412	1,844	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852
Transportation of Workers	80%	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Depreciation	100%	0	0	0	32,835	33,818	33,818	47,849	55,621	69,221	69,221	43,380	34,544	34,544	34,544	34,544	34,544	34,544
Administration	65%	6	6	6	473	473	473	477	477	477	477	477	477	477	477	477	477	477
Selling & Distribution	50%	1	1	23	139	163	165	202	235	248	250	250	250	250	250	250	250	250
Audit Fees	100%	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
I.T.F.Expenses	100%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interest	100%	43	6,177	12,778	16,210	33,660	38,978	48,472	47,043	39,353	27,657	23,066	21,547	19,701	17,650	16,700	11,339	10,040
Miscellenous	50%	45	45	45	411	576	580	602	730	777	777	777	777	777	777	777	777	777
Total Fixed Costs		447	6,580	13,203	53,232	72,608	78,365	103,208	110,517	95,656	84,968	74,537	64,183	62,336	60,085	57,336	53,970	52,675
Total Costs		566	6,699	13,344	91,997	127,288	133,051	158,819	178,366	169,064	157,385	146,953	136,599	134,752	132,502	129,752	126,387	125,092
Value of Production		0	0	0	44,789	69,050	71,383	109,454	143,098	156,935	158,097	158,097	158,097	158,097	158,097	158,097	158,097	158,097
Break-Even Level (current prod.)		No Prod.	No Prod.	No Prod.	883.7%	505.3%	469.4%	191.7%	146.9%	114.3%	99.2%	87.0%	76.9%	72.8%	70.1%	66.9%	63.0%	61.5%
Break-Even Level (total capacity)		No Prod..	No Prod..	No Prod..	751.1%	429.5%	398.9%	162.9%	126.8%	97.2%	84.3%	73.9%	65.7%	61.8%	59.6%	56.9%	53.5%	52.3%